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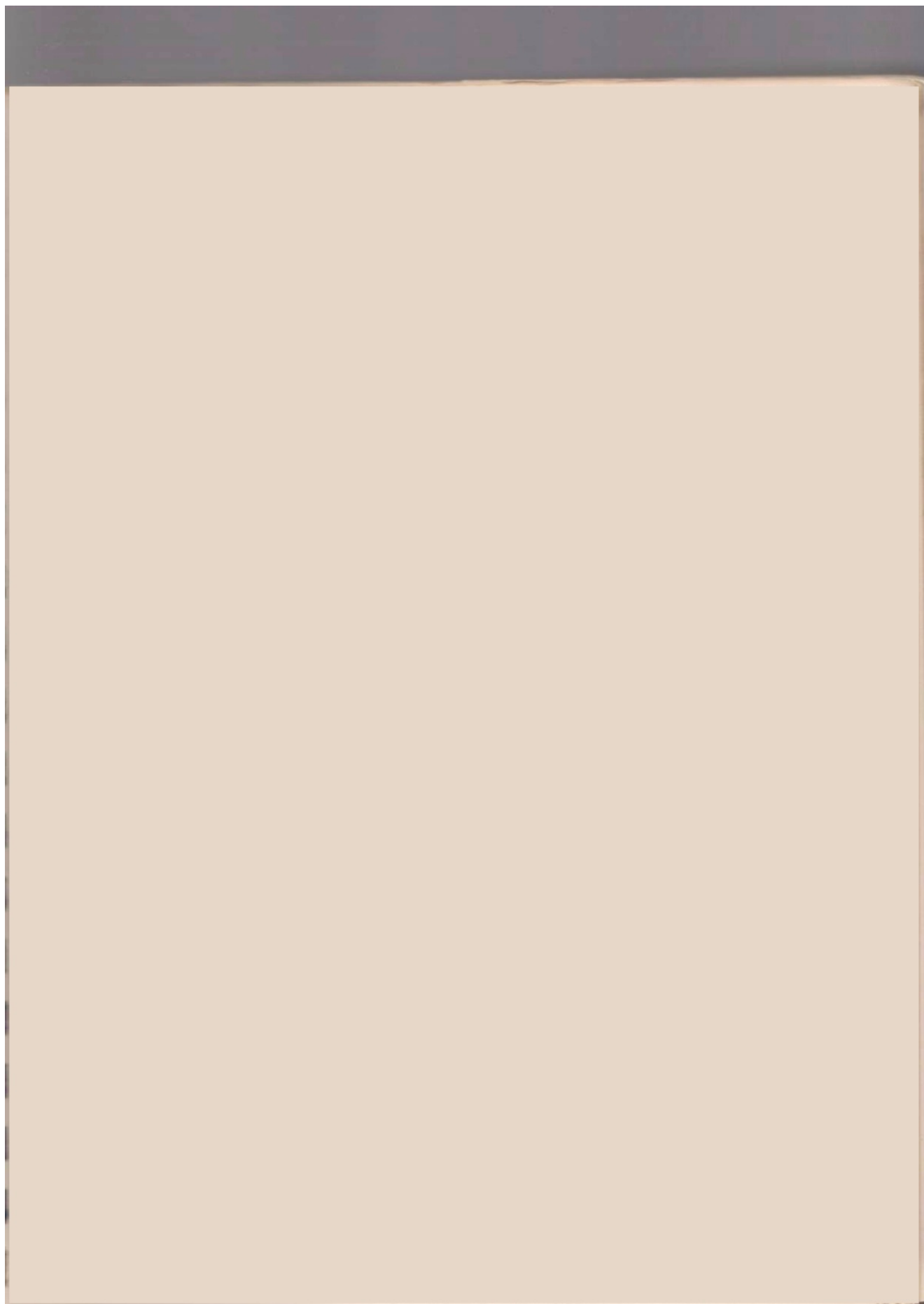
RAPID TRANSIT EXTENSION TO NORTHEAST BRONX, N.Y.



NEW YORK CITY TRANSIT AUTHORITY

OCTOBER 1977

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FINAL REPORT

**RAPID TRANSIT EXTENSION
TO NORTHEAST BRONX, N.Y.**

PROJECT NO. IT-09-0023, TS C230

NEW YORK CITY TRANSIT AUTHORITY

OCTOBER 1977

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SUMMARY OF STUDY RESULTS

SUMMARY OF STUDY RESULTS

PREFACE

This report presents the findings of an investigation to evaluate on an engineering and transportation basis alternative proposals for extending the Second Avenue Line into the Northeast Bronx.

In March of 1975, after the New York City Transit Authority entered into an agreement with the Tri-State Regional Planning Commission to prepare this technical study, the Mayor's Transportation Policy Committee issued a report which recommended a change in policy because of limited financial resources. The report recommended deferral of the Second Avenue Line and reordered priorities which concentrated on advancing the Queens Trunk Line. This line connects the midtown Manhattan Central Business District with Jamiaca Center in Queens via the 63rd Street Tunnel. Contracts underway on the Second Avenue Line would be carried to completion and Engineering Design work on the remainder of the route would continue so that the line could be advanced when additional funds became available. However in the immediate future, no further construction contracts would be awarded. The recommendations of the Transportation Policy Committee were adopted by the City as its new transit expansion program policy.

The final report which follows is presented on the premise that its findings will assist any future preliminary and/or final engineering work if the construction of the Second Avenue Line is resumed and progressed from its present deferred state.

In addition, two factors could be given consideration in any future resumption of work. The first is the possibility of alternative routings of the line through the South Bronx which could be given new impetus by policies at the federal level to assist renewal of urban core areas. The second is the possibility of reviewing in depth, the overall decline in Transit ridership and specifically its impact on the existing Lexington Avenue Line together with any future or present proposals for extending the Second Avenue Line into the Borough of the Bronx.

Finally although facilities for the elderly and handicapped were not specifically identified in the report, it should be stated that their feasibility was investigated and found "do-able" at all the proposed new station areas and sufficient contingencies were added to all the cost estimates for the addition of such facilities.

SUMMARY OF TRANSPORTATION AND ENGINEERING ANALYSIS

On both technical and economic considerations, all of which are discussed in detail in the body of this report, the following three proposals were selected for comprehensive study and evaluation.

1. A proposal which connects the new Second Avenue Line to the existing Pelham Bay Park and Dyre Avenue Lines.
2. A proposal which extends the new Second Avenue Line along the Penn Central right-of-way to the vicinity of Co-op City and also connects to the Dyre Avenue Line.
3. A proposal which extends the new Second Avenue Line to the existing White Plains Road and Dyre Avenue Lines.

The resulting evaluation and analysis is summarized briefly as follows:

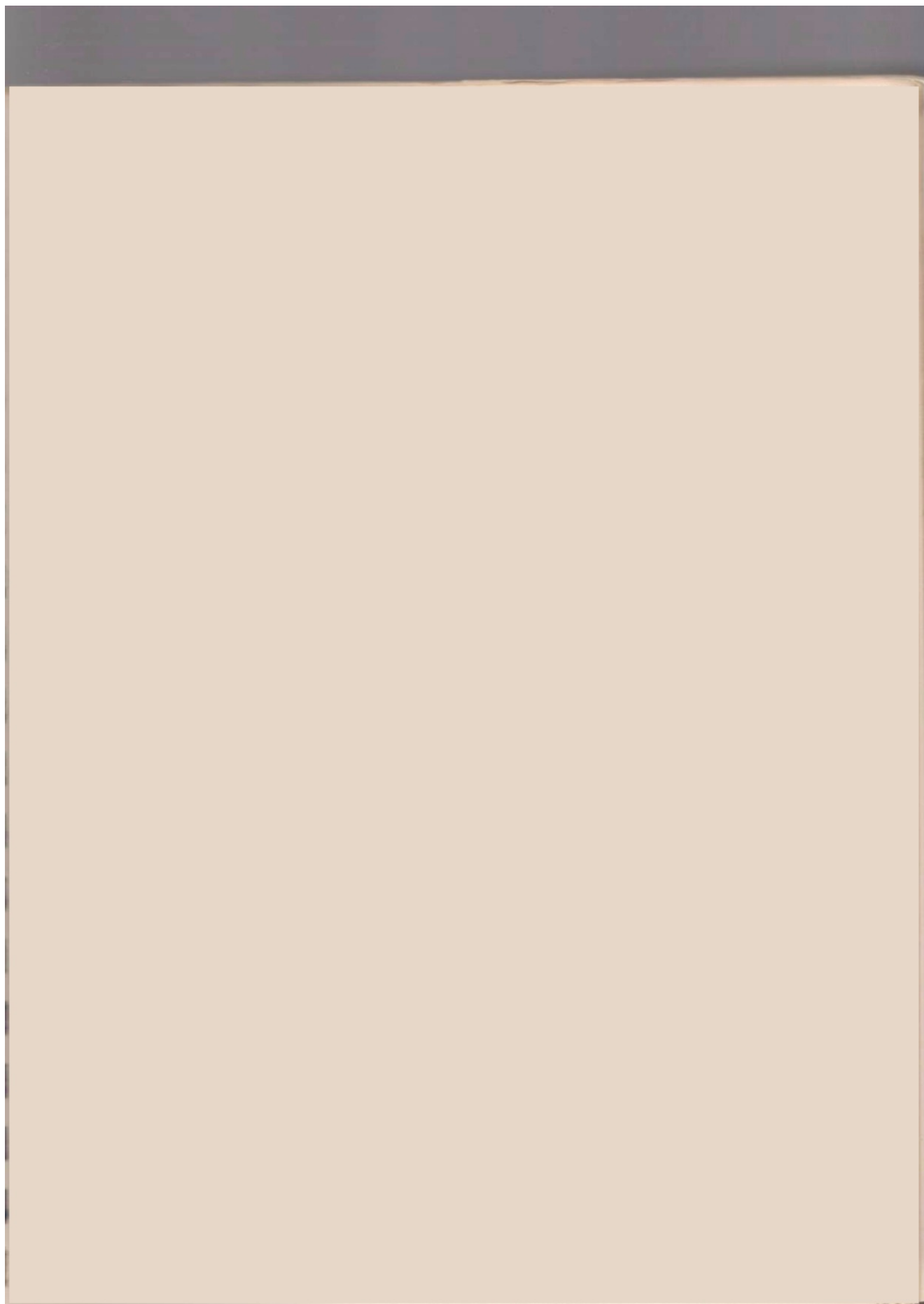
Transportation

1. All the proposals relieve the overcrowded Lexington Avenue Express, however the White Plains Road-Dyre proposal provides the most relief while assuring a good balance of use among all the lines.
2. The Penn Central-Dyre proposal is best in terms of access to existing and potential development, however it is rated poorly in terms of effects on private operators since it would divert many riders from such operations.
3. On balance, on a transportation basis, the Penn Central-Dyre and White Plains Road-Dyre proposal are about equal after trade-offs are made, while the Pelham-Dyre plan is not quite as good as either of the other two proposals.

Recommendations

1. On a capital cost basis the White Plains-Dyre proposal is the least expensive (\$261 million, followed by the Penn Central-Dyre plan (\$303 million) and the Pelham-Dyre proposal (\$321 million). Also it should be noted that approximately 25% of the total cost for each proposal is for car storage and maintenance facilities which are required for the entire Second Avenue Line.
2. On a net annual operating cost basis the Pelham-Dyre proposal is the least expensive (\$1.2 million/year), followed by the White Plains-Dyre proposal (\$9.3 million/year) and the Penn Central-Dyre plan (\$17.9 million/year).
3. For the White Plains-Dyre and Pelham-Dyre plans the private property required to implement their construction is limited to two vacant parcels. However, for the Penn Central-Dyre proposal 21 private properties are required, 16 in fee title and 5 in partial fee.
4. All the proposals would impact existing Transit Authority facilities equally. With regard to existing operations the Penn Central-Dyre plan has the least impact, followed by the White Plains-Dyre and Pelham-Dyre proposals.
5. In reference to the impact of construction on the study area the White Plains-Dyre plan would be the least disruptive, followed by the Penn Central-Dyre and Pelham-Dyre proposals.
6. The Pelham-Dyre and White Plains-Dyre proposals, both require that one branch of the Second Avenue Line be connected to elevated structures which at the present time are approximately 60 years of age. The Penn Central-Dyre proposal places both branches on existing railroad rights-of-way which are essentially on grade. Although at the present time the elevated structures of the White Plains Road and Pelham Lines are in good condition, connecting a new line to them is a negative factor in comparison to the Penn Central-Dyre proposal which does not have this requirement.

In summary it can be stated that the Pelham-Dyre plan on both an engineering and transportation basis is inferior to the other two proposals. On balance after the appropriate trade-offs are made the White Plains-Dyre and Penn Central-Dyre proposals can be considered equal. This is evident since the White Plains-Dyre plan offers economies in construction and operating costs while basically upgrading existing services, while the Penn Central-Dyre plan offers the best access to existing and potential development, at a higher cost, by providing a new line through the study area.



CHAPTER I

INTRODUCTION AND SCOPE

I. INTRODUCTION AND SCOPE

Overview - Regional and Metropolitan Context

The area in which this feasibility study is located is known as the New York, New Jersey and Connecticut Tri-State Metropolitan Region. This area is indicated on attached Figure 1. Within this area over 30 million person trips are made daily. Four commuter railroads, one interstate transit system (PATH) and a multitude of bus lines serve and connect the region to its focus, the central business district of New York City.

New York City Transit System

Within the City of New York the New York City Transit Authority (NYCTA) operates one of the largest systems of subways and buses in the world. It consists of approximately 360 route miles of rapid transit and 1,200 route miles of surface transit facilities, transporting 1.3 billion passengers yearly. The system is extensive and well integrated with other transit facilities and operates in all the five boroughs of the City including the Bronx the location of this feasibility study. The study area is indicated on attached Figure 2.

NYCTA Expansion Program

The New York City Transit Authority is presently engaged in an expansion program in which eleven new rapid transit routes have been proposed and approvals granted for their construction by the Board of Estimate and Mayor of the City of New York. The new lines comprise approximately 40 route miles of facilities and it is planned to fully integrate the new work with the existing system. It is expected that when completed the expanded system will relieve overcrowding that presently occurs during peak periods on several of the existing lines, will provide direct rapid transit access to large outlying areas of the City which are presently double fare zones and will provide service in the Borough of Manhattan specifically, along the Second Avenue corridor.

The Second Avenue Line (Manhattan)

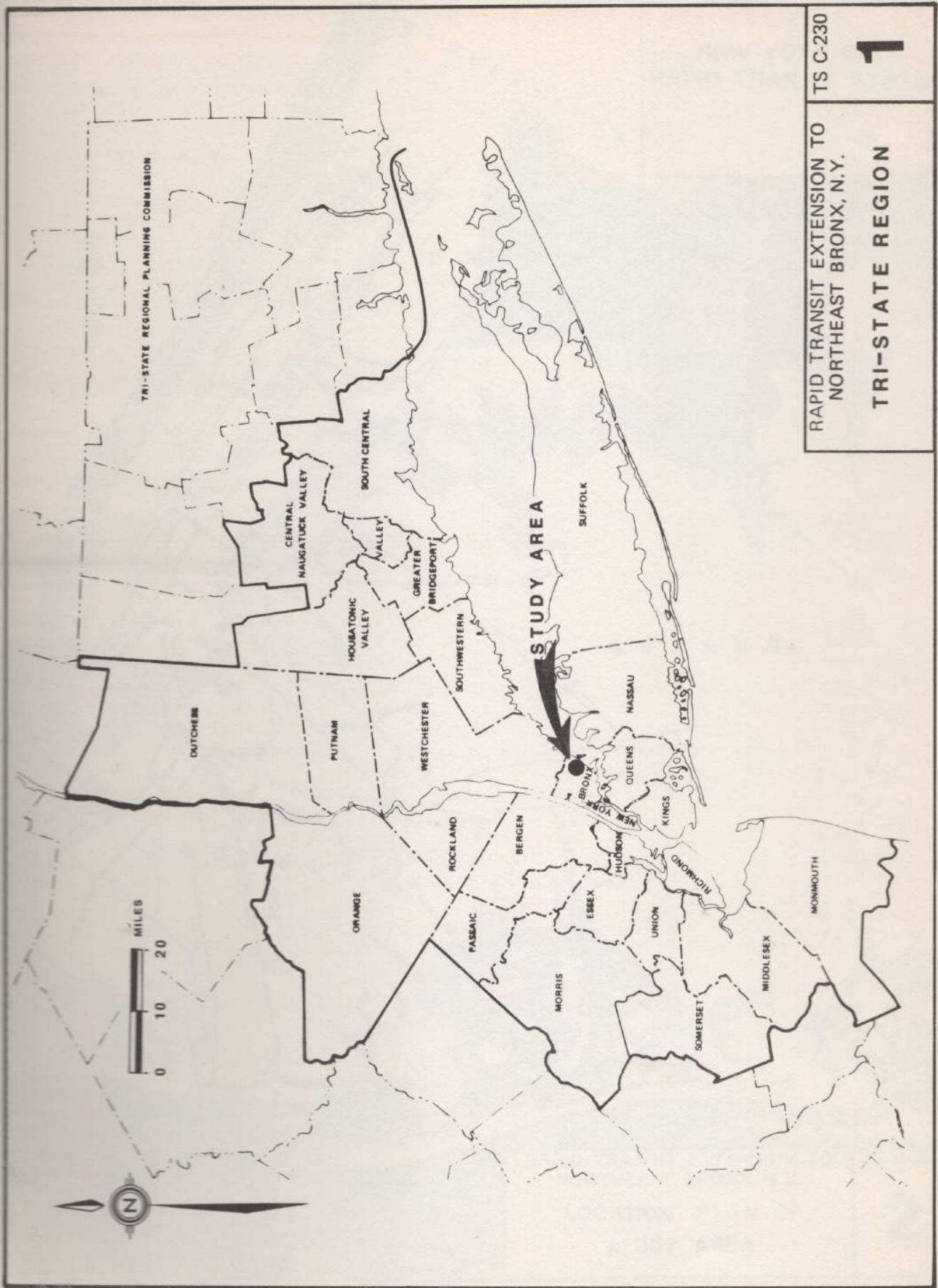
The Second Avenue Line in the Borough of Manhattan is one of the new routes of the New York City Transit Authority's expansion program. It extends from its southern terminal at Broad and Whitehall Streets in the financial district north along Water and Pearl Streets, St. James Place, Bowery and Chrystie Streets and then continues along the entire length of Second Avenue from E. 1 Street to E. 126th Street. The line will be 8.4 miles long and 15 new stations will be provided. At the intersection of Second Avenue and E. 63rd Street a high speed interchange will be provided between the proposed new E. 63rd Street Line and the Second Avenue Line. At the present time preliminary engineering design for the entire line has been completed, portions of final design are underway and several sections are under construction.

The Second Avenue Line (The Bronx)

North of 126th Street the approved Route and General Plan extends the line under and across the Harlem River to the Borough of the Bronx then east along 138th Street to the Penn-Central RR ROW then north to the vicinity of Hunts Point Avenue where a connection is made to the existing NYCTA Pelham Bay Park Line. North of Hunts Point the new line will extend along the Penn-Central ROW to East 174th Street then will continue north along the abandoned ROW of the Boston and Westchester RR which is presently owned by the City of New York, to the vicinity of East 180th Street where a connection will be made with the existing NYCTA Dyre Avenue Line. Three stations are proposed for the new line, one at Brook Avenue and E. 138th Street, a second at Hunts Point Avenue and a third at E. 180th Street. The Brook Avenue and Hunts Point Avenue stations are to have transfer facilities with existing Pelham Bay Park Line stations and the E. 180th Street Station is to have transfer facilities with the existing E. 180th Street station of the White Plains Road Line.

Route 132-B - Design Development

On February 24, 1972 the New York City Transit Authority retained the firm of Sverdrup & Parcel and Associates to prepare a Phase I, Design Development report for the proposed Second Avenue Line between East 126th Street in Manhattan and East 180th



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

TS C-230

1

TRI-STATE REGION

NEW YORK CITY
RAPID TRANSIT SYSTEM

STUDY AREA

NEW
JERSEY

WESTCHESTER

THE
BRONX

QUEENS

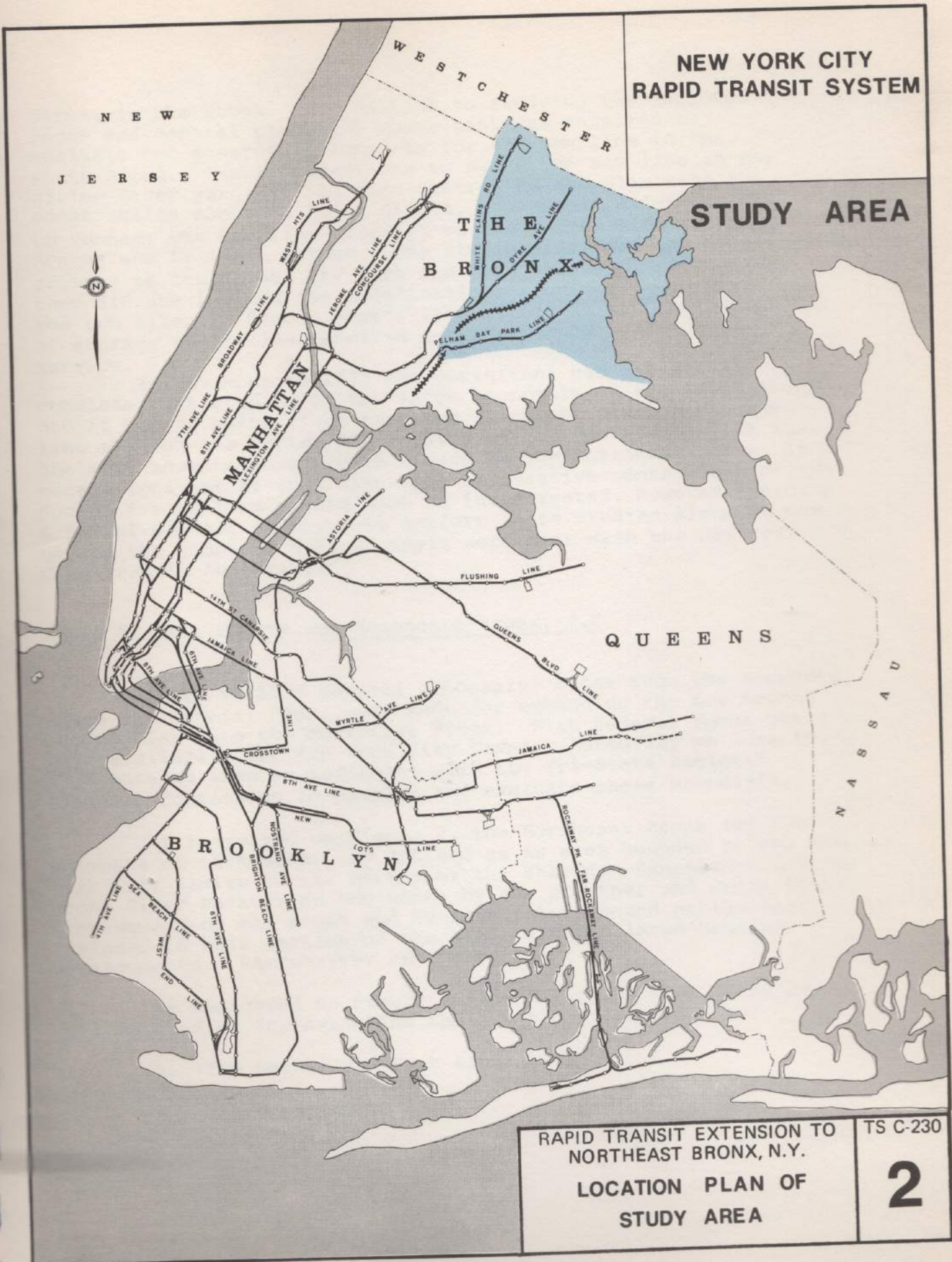
BROOKLYN

NASSAU

RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
LOCATION PLAN OF
STUDY AREA

TS C-230

2



Street in the Bronx. In addition to studying the approved route and general plan, the consultant was required to evaluate two separate alignments for the new line in the South Bronx. One alignment was to place the new line in the Harlem River yards of the Penn-Central RR and eliminate the construction along E. 138th Street, the second alignment was to connect the new line directly to the Pelham Line at Third Avenue and E. 138th Street. The studies included the connections to the Pelham Bay Park and Dyre Avenue Lines, however they did not include the modifications required to convert the two lines to Second Avenue Line standards and the expansion of storage facilities required for the Second Avenue Line service.

In November of 1972 the consultant had essentially completed the studies of the three proposals in the South Bronx and it became quite clear that the alignment placing the new line through the Harlem River yards of the Penn-Central RR was the most advantageous. With regard to the northeast Bronx, it became apparent at this time that alternative connections of the Second Avenue Line should also be investigated, however Sverdrup & Parcel was not required to perform these studies since it was beyond the scope of work of their agreement with the New York City Transit Authority.

Rapid Transit Extensions Northeast Bronx, N.Y.

Early in 1973 several proposals, other than the approved Route and General Plan, were made for extending the new Second Avenue Line into the northeast Bronx. With federal funds being made available, the New York City Transit Authority on June 29, 1973 entered into an agreement with the Tri-State Regional Planning Commission to develop and evaluate these proposals.

As indicated on Figure 2, the Northeast Bronx for the purposes of this study, is defined as an area bounded by the New York City limits on the north; by the Sheridan Expressway and the Bronx River Parkway on the west; by the Bruckner and Cross Bronx Expressways on the south and by Long Island Sound on the east. Included in this section of the Bronx are two large housing developments - Parkchester and Co-op City.

As indicated on Figure 3, the following four corridors will be studied for extending the new rapid transit line:

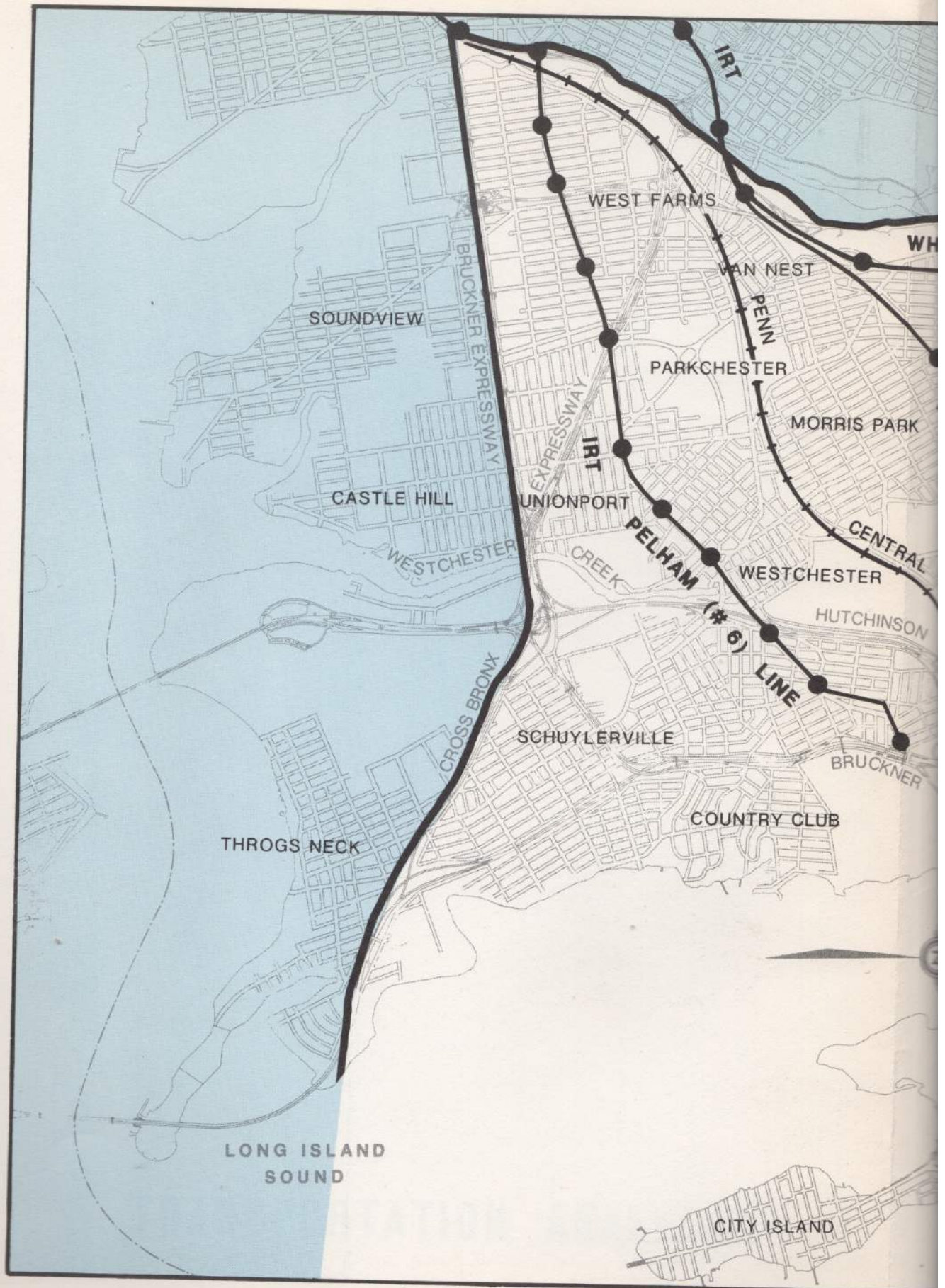
- a. The Pelham Bay Park Line
- b. The Dyre Avenue Line

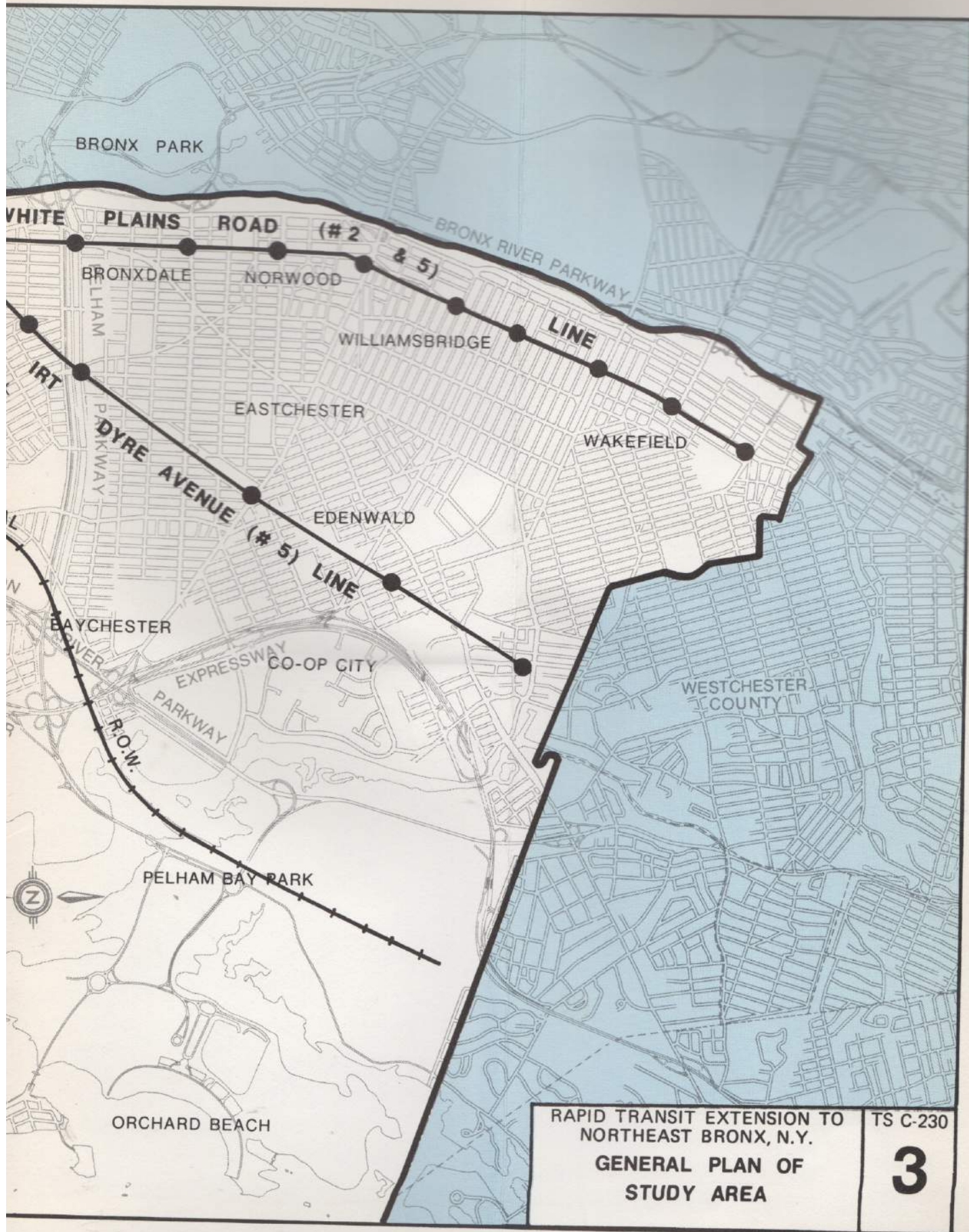
- c. The White Plains Road Line
- d. The Penn Central Railroad right-of-way

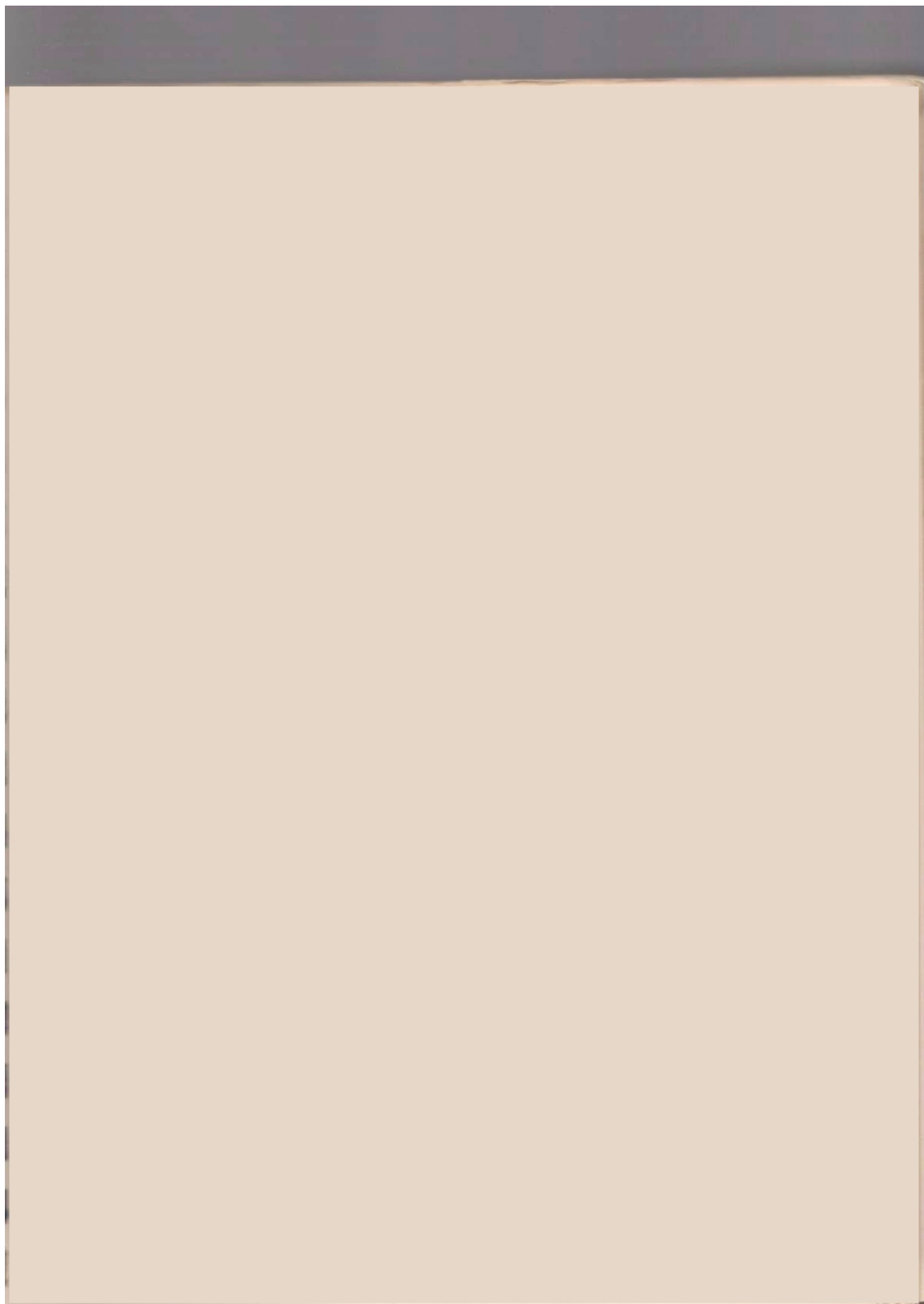
The study will focus primarily on the evaluation of the following three proposals in the area north of Hunts Point Avenue:

1. The presently approved route and general plan which connects the new line to the existing Pelham Bay Park and Dyre Avenue Lines.
2. A proposal which consists of extending the new line along the Penn Central right-of-way to the vicinity of Co-op City and connecting to the Dyre Avenue Line.
3. A proposal for connecting the new line to the existing White Plains Road and Dyre Avenue Lines.

The objective of this study is to perform a complete transportation and engineering analysis of the proposals together with a full evaluation so that a plan can be selected for extending the Second Avenue Line into the Northeast Bronx.







CHAPTER II

TRANSPORTATION ANALYSIS

II. TRANSPORTATION ANALYSIS

Introduction

In this Chapter a comprehensive analysis of passenger flows of the alternate proposals for extending the Second Avenue Line into the Northeast Bronx, is presented.

The analysis focuses on the evaluation of the three proposals described in Chapter I. These three proposals were chosen for their general technical and economic feasibility as outlined in Chapter III and Chapter V. For reference they are described briefly as follows:

1. A plan which connects the Second Avenue Line to the existing Pelham Line near Whitlock Avenue and the existing Dyre Avenue Line at E. 180th Street. This plan is referred to as the Pelham-Dyre Proposal.
2. A plan to extend the Second Avenue Line along the Penn Central right-of-way to a point near the Hutchinson River, with a connection to the existing Dyre Avenue Line at E. 180th Street. This plan is referred to as the Penn Central Dyre Proposal.
3. A plan to connect the Second Avenue Line to the existing White Plains Road and Dyre Avenue Lines at E. 180th Street. This plan is referred to as the White Plains Dyre Proposal.

All the proposals are located within the study area and along the corridors described in Chapter I. Reference to Figure 2 and Figure 3 in Chapter I is made. More specifically the general configuration of the proposals in relation to the existing transit facilities is indicated on Figures 40, 41 and 42, Chapter V.

Methodology

The transportation analysis was carried out by studying the existing transportation network and travel patterns, and projecting variances in travel patterns as a result of projected land use and population changes and the network changes resulting from the adoption of each of the proposals to be studied.

The methodology adopted is a reflection of the following elements which set this study apart from other transportation analyses:

1. The study area is not large; it is only a small part of a major Metropolitan region. Therefore, highly sophisticated models developed for metropolitan regions in general or the New York area specifically, are not necessarily valid;
2. The proposals being studied involve not the introduction of a new mode, but an expansion of the existing subway system which is already in place. Therefore, the development of a predictive modal split model did not seem to be appropriate;
3. The subway currently carries 80 percent of the study-area-to-Manhattan work trips. This is shown in Table 1. Therefore, there is a low potential for significant diversion from other modes to subway. This furthers the argument that a predictive modal split model probably is not warranted; and
4. Each of the three proposals offer advantages over the existing system and, therefore, consideration must be given to diversion of travelers to the subway from other modes as a result of service changes. Because the basic purpose of this study is to provide information to the NYCTA upon which a decision can be made among various alternatives, the decision, not the data, is the ultimate end product. Therefore, an analysis to exhibit the sensitivity of the decision to changes in modal split was carried out. This technique also indicated the level of confidence in one decision as opposed to another.

The method chosen for this analysis was to develop an assignment model. This model assigned travelers from study area census tracts to appropriate subway stations and to subway lines at critical cordons.

As stated above, the subway is used to transport passengers from the study area primarily to Manhattan. Table 1 showed that 80 percent of the study-area work trips by subway are destined for Manhattan. These trips usually take place during the peak hours when the trains are very crowded. In off-peak periods, however, there is sufficient capacity to accommodate passengers. This is reflected in the fact that trains, which are scheduled to provide approximate capacity to accommodate passenger

TABLE 1

STUDY AREA TO MANHATTAN WORK TRIPS BY MODE

Mode	Number of Trips	Modal Split
Automobile	9,702	14%
Bus	2,398	4%
Subway	53,072	80%
Other*	1,198	2%
Total	66,370	100%

* Rail, Taxis, Walking, et al

Source: 1970 Census

demand, operate at about five-minute headways on the trunk portions of their routes during off-peak periods. One of the primary reasons that the Authority is building new subways is to relieve the overcrowding in the peak periods in addition to the desire to expand service to currently unserved areas. Therefore, the critical time of day is the peak period. As a result of this fact, the analysis work was carried out for the peak period. One hour, the AM peak hour, was chosen as the time period that would be studied.

The choice of the AM peak hour for analysis was based on the fact that the census data which was used as the basic origin-destination data is for home-to-work trips, the majority of which take place in the AM peak period. Also, the AM peak period consists mostly of home-to-work trips, and very few recreation or shopping trips for which data is not readily available.

The base year chosen for this study was 1973 because it was the last full year for which transit data was available as the analysis was performed in Spring/Summer 1974. Therefore, all base year data that was taken other than in 1973 was adjusted to reflect 1973 conditions. The basic travel pattern data was taken from the 1970 Census. Specifically, the data is for home-to-work trips. Studies have shown that the total number of homebased work trips are primarily a function of population.¹ Therefore, to convert the 1970 data to 1973 data, the total number of trips was changed in proportion to the changes in population. The only significant population change in the eastern Bronx between 1970 and 1973 was in Co-op City, where occupancy of the development was completed about 1971. The modal split for 1973 has assumed to be the same as in 1970, except for the addition of express buses.

This assumption was validated in the passenger flow analysis for the base year, 1973, because the model-predicted number of trips by each mode was close to the observed number.

The data used in this study came from several sources, and their form influenced some of the work. For example, because the basic travel pattern data is from the 1970 Census, the transportation analysis zones were chosen to be coincident with census tracts. There are 136 census tracts in the study area.

1. Alan M. Voorhees, A system Sensitive Approach for Forecasting Urbanized Area Travel Demands, prepared for the U.S. Department of Transportation, Federal Highway Administration, Urban Planning Division, December, 1971.

There are an additional 25 census tracts in the eastern Bronx outside the study area, which are tributary to the subway stations in the study area.

All or part of each census tract in the eastern Bronx was assigned to a subway station and/or an express bus line. The assignment of all home-to-work rapid transit trips and express bus trips from a census tract to a subway station and/or to an express bus stop was based on the following criteria:

1. Where the entire tract is within walking distance of a subway station, then all subway trips from that tract were assigned to that station;
2. Where a tract is within walking distance of more than one station then the subway trips were divided among the stations based on relative walking distance and the population distribution within the tract;
3. Where a tract is not within walking distance of a subway station then the subway trips from that tract were assigned to a subway station which was connected to that tract by a local bus line; and
4. Where a tract contained or was within walking distance of an express bus stop, then Bronx-to-Manhattan work trips were assigned to express bus mode to the extent that patronage data indicated.

By adjusting the assignments, and applying a percentage reduction to convert the home-to-work subway trips to AM peak hour transit (subway and express bus) trips, a model was developed for the study area for the Fall of 1973. This technique not only validated the assignment model, but also validated the 1973 modal split for the two Bronx-to-Manhattan transit modes.

This validated model was then applied to the future year situation for each proposal, and for a test percentage diversion from auto. The total number of home-to-work trips were assumed to be a function of population. The census tracts were assigned to the future year network for each proposal. The assignment was essentially the same for the Pelham-Dyre and White Plains-Dyre Proposals as it was for the 1973 situation, because the only new rapid transit facility in the future year is the station at 174th Street and Bronx River Avenue. However, the Penn Central-Dyre Proposal adds five stations to the transit network over and above the three added by the other alternatives. Therefore, the tracts located in the area of the Penn Central Line were reassigned to the station stops along that new line, using the same criteria of assignment as was used for the 1973 situation.

The future year chosen for this analysis is 1990, because this is the year for which the City Planning Commission provided population projections. It is also sufficiently far into the future to allow for planning, engineering, design and construction of the new transit facilities, and for passenger travel patterns to change and settle into their new forms. The choice of 1990 is also good because it is at the outer time frame limit of known planned developments in both the Bronx and Manhattan. Any land developments which are so large as to affect subway travel patterns significantly probably could not be planned, designed, approved and built much before 1990, if they are not known today.

Assumptions

In addition to the assumptions required to determine the assignment model as discussed above, a number of other assumptions were made. These assumptions are as follows:

1. *The only changes in the transportation network that would be considered for analysis are those explicitly embodied in the three proposals studied;*
2. The relative transit fare structure between the various modes of transportation in the study area will remain essentially unchanged in comparison to the base year 1973.
3. The IRT service and the new Second Avenue services *would have similar passenger amenities.* For example, all IRT cars would be upgraded to provide air conditioning, and only air conditioned cars would be used *on the Second Avenue services; and*
4. Once passengers have chosen the subway mode, they will choose the routing through the system that involves the minimum time path. The minimum time path from a Bronx subway station to any Census tract destination in Manhattan includes subway running time, transfer time (if any), and walk time from destination subway station to centroid of the destination Census tract. Transfer times are approximated as follows: for same-platform transfer, the time is equal to the average waiting time (half the headway of the service being transferred to); and for a walking transfer, the transfer time is estimated to the nearest minute and is added to the average wait time. The walking time from a Manhattan subway station to the approximate center of a Manhattan Census tract was estimated to the nearest minute.

Other assumptions used are detailed in the appropriate portions of the detailed discussion of the work. The detailed analysis is described in the following four sections.

Description of the Study Area

Contains discussion of current and future land use, including residential, commercial, industrial development and the location of study area institutions.

Present Transportation System

Contains details of all existing transportation facilities currently available in the Northeast Bronx.

Transportation Analysis

Contains a detailed description of the three proposals and the results of the transportation analysis of each.

The comparison of the three proposals on both a transportation and engineering basis will be presented in Chapter VII.

Description of the Study Area

a. Physical Description

The study area is the northeastern section of the Borough of the Bronx, City of New York and is shown on Figure 2. It is about ten miles northeast of midtown Manhattan, and is bounded by the New York City limits on the north; by the Bronx River Parkway and Sheridan Expressway on the west; by the Bruckner and Cross-Bronx Expressways on the south; and by Long Island Sound on the east.

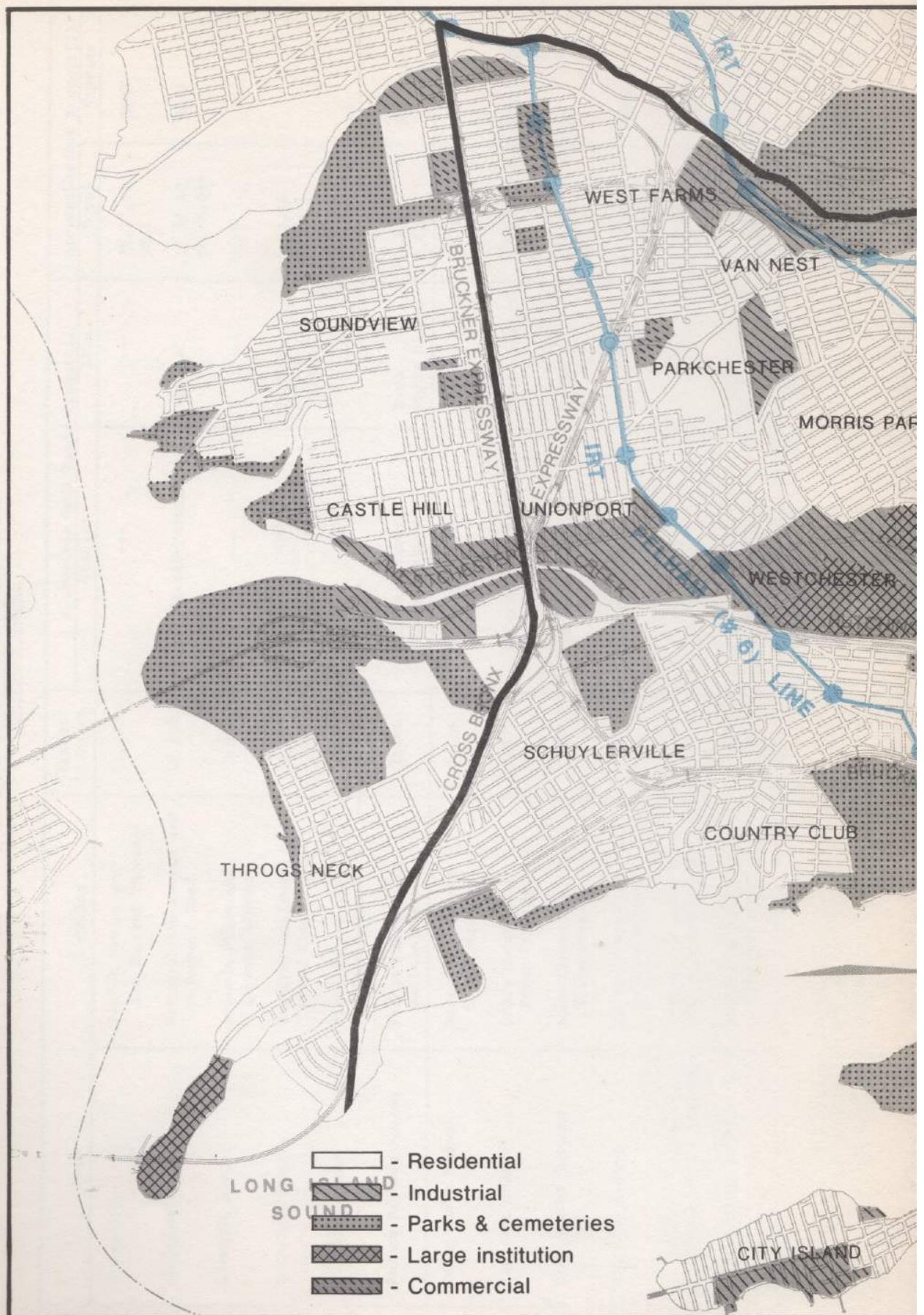
The study area is just over 18 square miles. The land is basically flat, rising from sea level at the shore of Long Island Sound and Eastchester Bay to an elevation of about 180 feet along the western edge of the study area. The average elevation is about 25 feet above sea level.

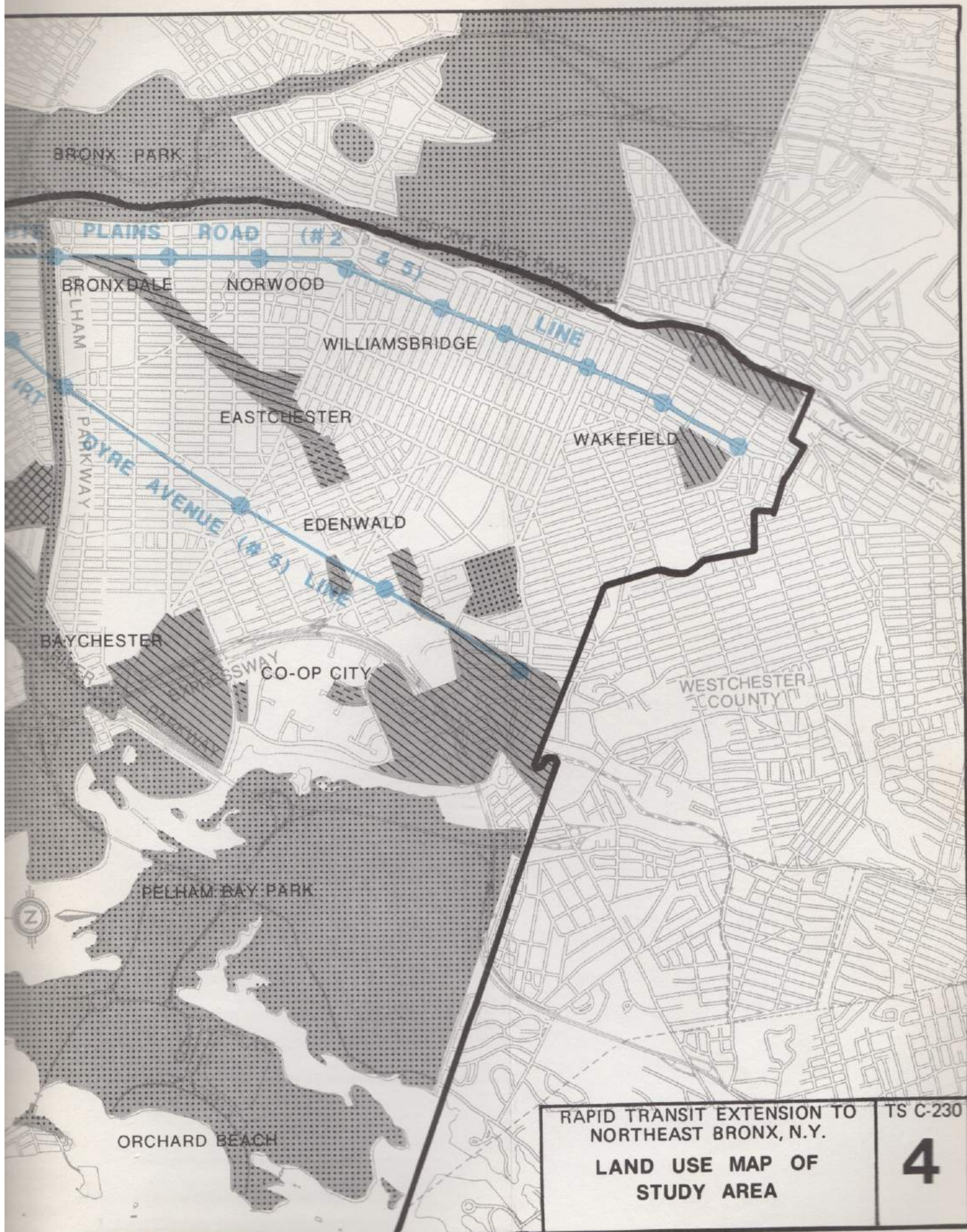
The prominent topographical features of the study area are the Hutchinson River in the northern part of the study area, Westchester Creek, which bisects the southern border, and the Bronx River along the western edge of the study area. All three of these waterways flow from north to south.

b. Land Use

Figure 4 is a map of land use in the study area. As can be seen on the Figure, the study area is basically residential. The area's housing is approximately 30 percent owner-occupied and 70 percent rental. The owner-occupied units are principally in lower density neighborhoods in the northern and eastern parts of the study area. The housing units are generally of modern design, basically sound and in good condition. Within the Northeast Bronx there are many major housing complexes. Table 2 lists the complexes with over 500 housing units. Figure 5 shows their approximate locations. Two complexes, Co-op City and Parkchester, are among the largest housing developments in the United States, and contain many facilities within their boundaries. Table 2 also shows access to public transportation from the major housing complexes. Parkchester is served by subway, express bus and local bus. Co-op City is served by express bus and local bus only. All other housing developments are served by some form of public transportation, with most of the complexes served by both subway and bus.

The commercial areas of the Northeast Bronx are mostly local retail shops for convenience goods, and are located throughout the study area. However, a regional shopping area is located in the Parkchester development.





RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
LAND USE MAP OF
STUDY AREA

TABLE 2

MAJOR HOUSING COMPLEXES (1)
IN STUDY AREA

Name	Location	Number of Units	Accessible Rail Rapid Transit(2)		Accessible Bus Transit(3)	
			Station	Line	Local	Express
Co-op City	Bartow Avenue and New England Thruway	15,372	---	---	15,17,52 QBx1	BxM7
Parkchester	Metropolitan Avenue and Unionport Road	12,512	177 Street-Parkchester	Pelham	13,36,40, 42,54,Q44	BxM6
Edenwald Houses	Grenada Place and Laconia Avenue	2,039	---	---	9,19	--
Bronxdale Houses	Bruckner Boulevard and Sound View Avenue	1,497	Morrison Avenue St. Lawrence Avenue 177 Street-Parkchester	Pelham Pelham Pelham	5,27,36 54	
Hillside Homes	Hicks Street and Wilson Avenue	1,412	---	---	6,7,9	61
Pelham Parkway Houses	Pelham Parkway and Wallace Avenue	1,266	Pelham Parkway Pelham Parkway	Dyre White Plains	7,8,12 2,8,60	BxM11,61
Bronx River Houses	Harrod Avenue and 174 Street	1,246	Morrison Avenue	Pelham	36, Q44,	
Parkside Houses	Arnow Avenue and Bronx Park East	879	Allerton Avenue	White Plains	7,17,28, 60	BxM11,61
Eastchester Gardens	Adee Avenue and Yates Avenue	874	Gun Hill Road	Dyre	6,7,15, 60	61
Gun Hill Houses	Gun Hill Road and Holland Avenue	733	Gun Hill Road	White Plains	6,15,28 41,55	BxM11
A. Einstein College of Medicine Staff Housing	Eastchester Road and Morris Park Avenue	634	---	---	9,26,8	---
Boston-Secor Houses	Boston Road and Steenwick Avenue	538	Dyre Avenue Baychester Avenue	Dyre Dyre	7 14,15,17,52 60	61

Notes: (1) Housing developments with over 500 units.
(2) Within 0.5 miles
(3) Within 0.2 miles

Industrial areas are found along the Penn Central right-of-way north of Parkchester. These areas are generally underutilized, especially the one at Westchester Creek, however they provide employment for about 6,000 blue collar workers. The industrial areas of the Northeast Bronx generally have good access by road, rail and water and have reasonably low rents. The City is encouraging increased industrial development for these areas. The Zerega Avenue Renewal Project located on Westchester Creek just north of the Cross-Bronx Expressway, is an example of this policy.

Approximately 20 percent of the study area is occupied by Pelham Bay Park, the largest in the City, with over 2,000 acres. Although the park has large, undeveloped sections, it does contain a golf course and Orchard Beach, which can accommodate up to about 100,000 bathers. Bronx Park, containing the world famous Zoological Garden and the New York Botanical Gardens, is immediately adjacent to the western edge of the study area.

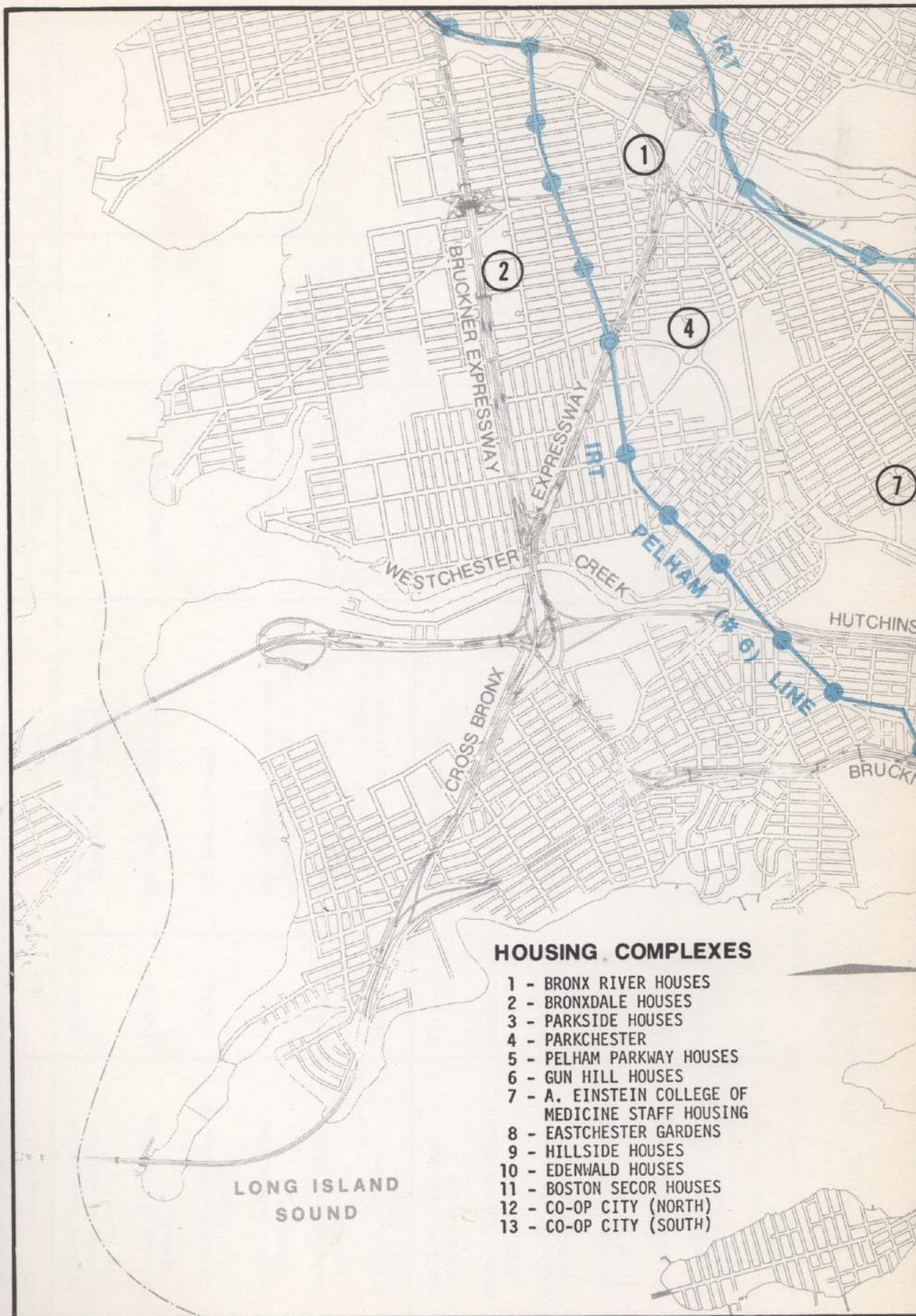
Only a small portion of the study area is not developed. Undeveloped tracts, located in the eastern part of the study area, are zoned mostly for manufacturing and/or industrial use. A prime parcel is the 83-acre site at the intersection of the Hutchinson River Parkway and the New England Thruway, at Co-op City. There are also large undeveloped parcels in Eastchester (94 acres), Baychester (151 acres), and Westchester (204 acres). Within the study area are several regional facilities and major institutions. Education facilities are listed on Table 3. The distinguished Albert Einstein College of Medicine of Yeshiva University, the only institution of higher learning in the Northeast Bronx, is served by several local bus lines. All the area's secondary schools, both public and parochial, are served by local bus lines, and some are within walking distance of a subway station. The location of these educational facilities is shown on Figure 6.

Hospital facilities are located throughout the Northeast Bronx. They are listed on Table 4 and their locations are shown on Figure 7. On the Table, it can be seen that all are served by local buses and some are served by subway.

In general, the Northeast Bronx provides attractions for people throughout the Borough as well as from other parts of the City. The area does lack employment opportunities, which is a characteristic of most residential areas of the City indicating that there is need for access to the City's central business district: Midtown and Lower Manhattan.

c. Future Development

The areas most likely to experience development in the



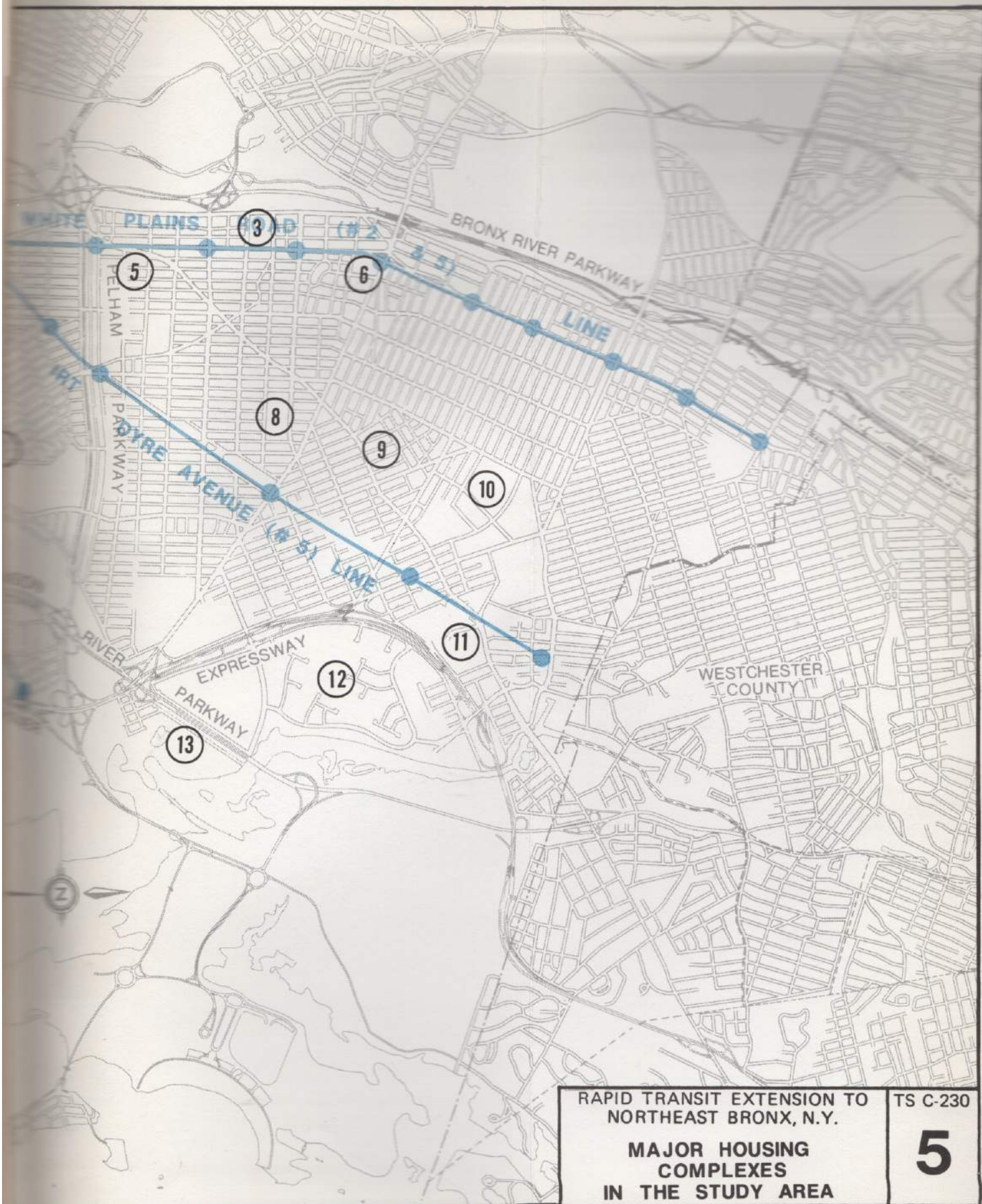


TABLE 3
COLLEGES AND HIGH SCHOOLS
IN STUDY AREA

Name	Type	Location	Accessible Rail Rapid Transit(1)		Accessible Local Bus Routes(2)
			Station	Line	
Yeshiva University-Einstein College of Medicine	University	Eastchester Road and Morris Park Avenue	--	--	8, 9, 26
Evander Childs High School	Public	800 East Gun Hill Road	Gun Hill Road	White Plains	6, 8, 15
Christopher Columbus High School	Public	925 Astor Avenue	--	--	8, 12
Herbert Lehman High School	Public	East Tremont Avenue and Hutchinson River Parkway	Westchester Square	Pelham	8, 9, 22, 40, 42
James Monroe High School	Public	Boynton Avenue and 172 Street	Elder Avenue	Pelham	27, 36, 42
Harry S. Truman High School	Public	750 Baychester Avenue	--	--	15, 17, 52, QBx1
Cardinal Spellman High School	Catholic	1991 Needham Avenue	Baychester Avenue	Dyre	7, 9, 19, 60
Mother Butler Memorial High School	Catholic	1500 Pelham Parkway South	--	--	5, 9, 12
Mount St. Michael High School	Catholic	4300 Murdock Avenue	--	--	16, 19
Our Saviour Lutheran High School	Lutheran	1734 Williamsbridge Road	--	--	8, 26
St. Catherine Academy	Catholic	2250 Williamsbridge Road	Pelham Parkway	Dyre	5, 8, 12
St. Raymonds Boys High School	Catholic	2151 St. Raymonds Avenue	Castle Hill Avenue	Pelham	13, 40, 54
St. Raymonds Girls Academy	Catholic	2380 East Tremont Avenue	Castle Hill Avenue	Pelham	13, 40, 54

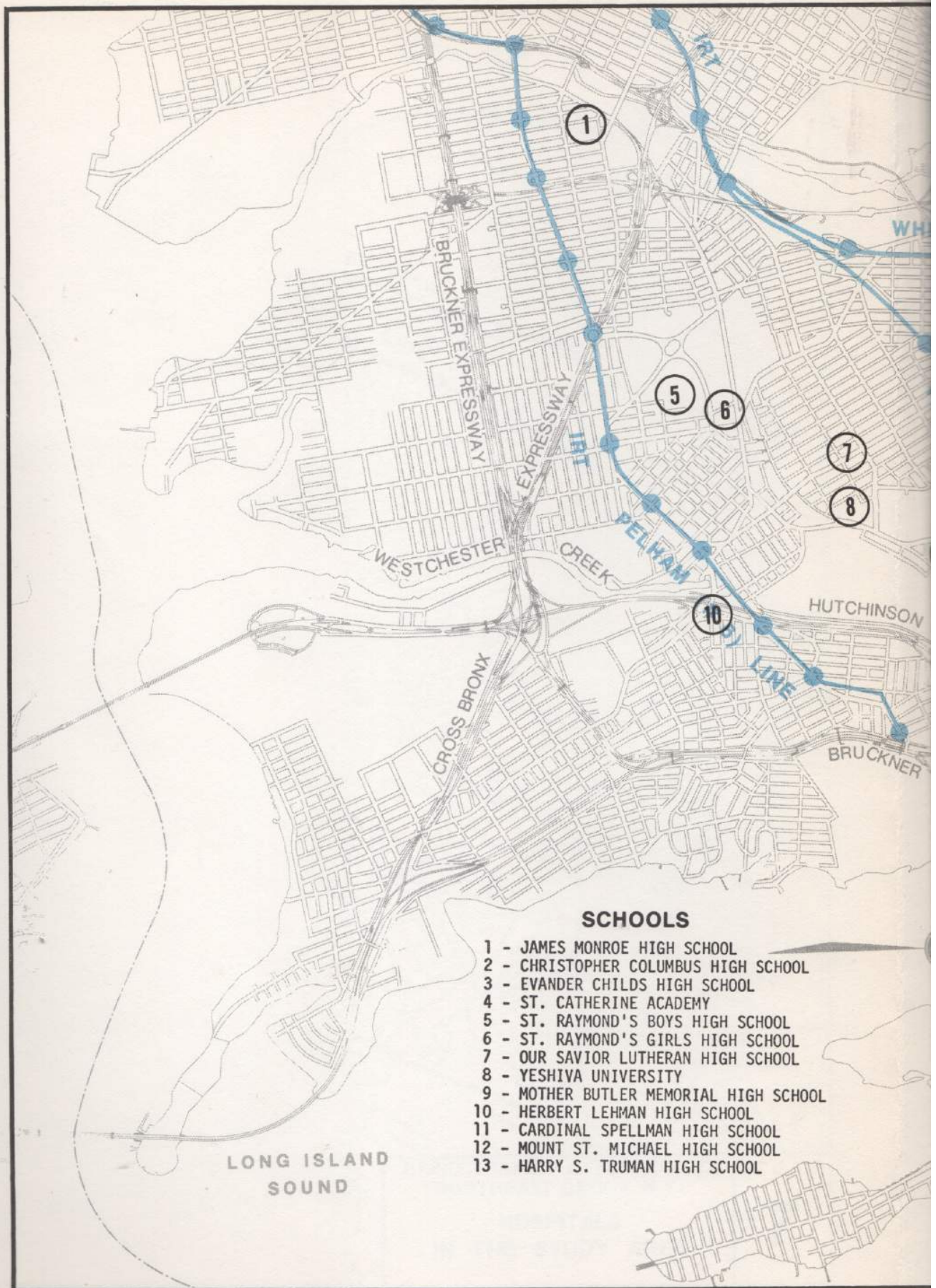
Notes: (1) Within 0.5 miles
(2) Within 0.2 miles

TABLE 4

HOSPITALS IN STUDY AREA

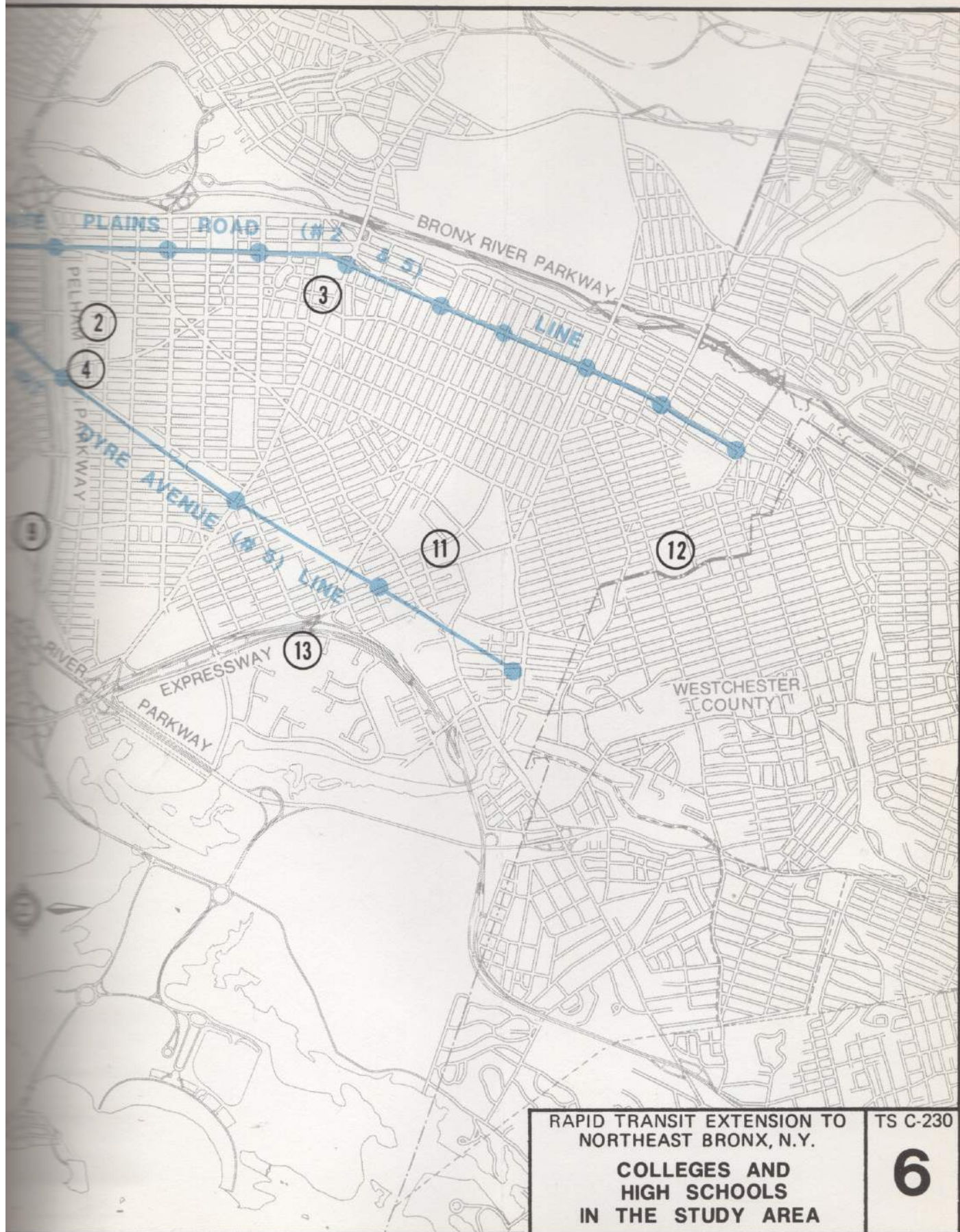
Name	Location	Number of Beds	Accessible Rail Rapid Transit(1)		Accessible Local Bus Routes(2)
			Station	Line	
Bronx Municipal Hospital Center (Jacobi)	Eastchester Road and Pelham Parkway	1,236	--	--	5,9,12
Bronx State Hospital	Hutchinson Road and Pelham Parkway	1,120	--	--	22
Misericordia Hospital	600 East 233 Street	332	233 Street	White Plains	9,14,41
A. Einstein College of Medicine Hospital	Eastchester Road and Morris Park Avenue	329	--	--	9,26
Westchester Square Hospital	2475 St. Raymonds Ave.	224	--	--	40,54
Parkchester General Hospital	1425 Zerega Avenue	208	Zerega Ave	Pelham	42
Pelham Bay General Hospital	1870 Pelham Parkway	184	Pelham Bay Park	Pelham	5,12,22,QBxl

Notes: (1) Within 0.5 mile (0.8 km)
 (2) Within 0.2 mile (0.3 km)



SCHOOLS

- 1 - JAMES MONROE HIGH SCHOOL
- 2 - CHRISTOPHER COLUMBUS HIGH SCHOOL
- 3 - EVANDER CHILDS HIGH SCHOOL
- 4 - ST. CATHERINE ACADEMY
- 5 - ST. RAYMOND'S BOYS HIGH SCHOOL
- 6 - ST. RAYMOND'S GIRLS HIGH SCHOOL
- 7 - OUR SAVIOR LUTHERAN HIGH SCHOOL
- 8 - YESHIVA UNIVERSITY
- 9 - MOTHER BUTLER MEMORIAL HIGH SCHOOL
- 10 - HERBERT LEHMAN HIGH SCHOOL
- 11 - CARDINAL SPELLMAN HIGH SCHOOL
- 12 - MOUNT ST. MICHAEL HIGH SCHOOL
- 13 - HARRY S. TRUMAN HIGH SCHOOL

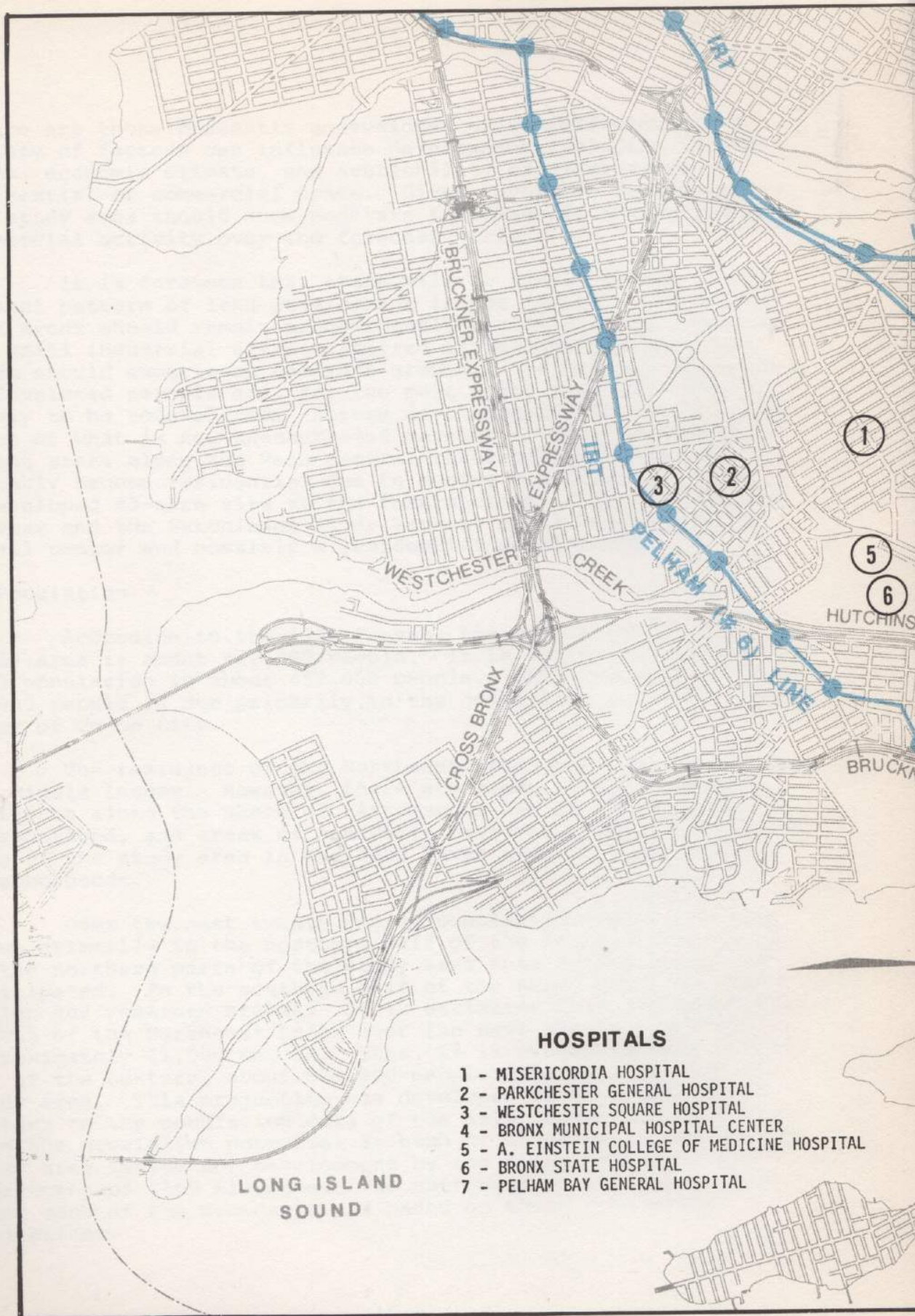


RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

COLLEGES AND
HIGH SCHOOLS
IN THE STUDY AREA

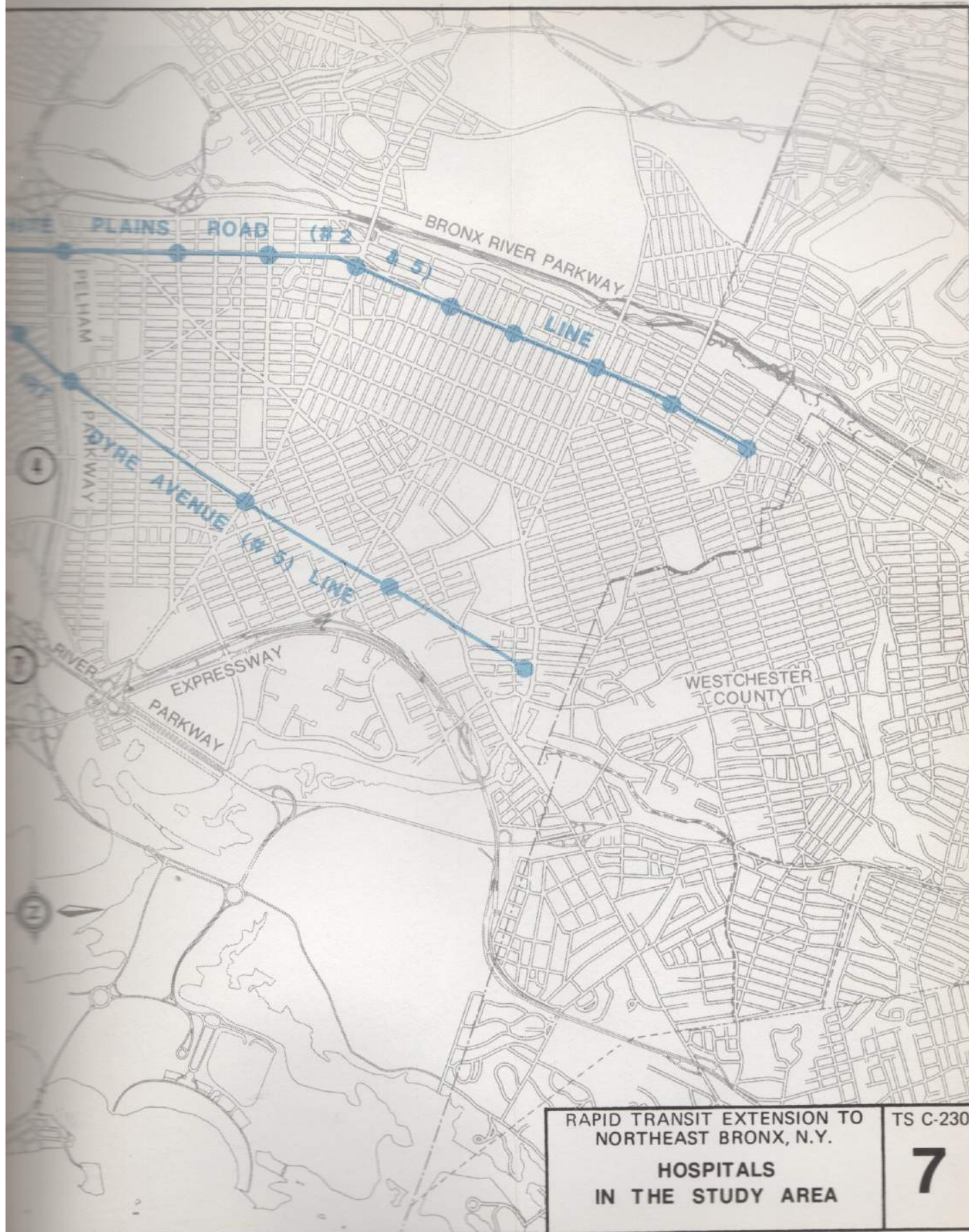
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6



HOSPITALS

- 1 - MISERICORDIA HOSPITAL
- 2 - PARKCHESTER GENERAL HOSPITAL
- 3 - WESTCHESTER SQUARE HOSPITAL
- 4 - BRONX MUNICIPAL HOSPITAL CENTER
- 5 - A. EINSTEIN COLLEGE OF MEDICINE HOSPITAL
- 6 - BRONX STATE HOSPITAL
- 7 - PELHAM BAY GENERAL HOSPITAL



future are those presently undeveloped or underdeveloped. A variety of factors can influence development including interest rates, economic climate, and availability of alternative residential or commercial space. Given favorable circumstances, the study area should show moderate increases in population and commercial activity over the forecast period.

It is foreseen that there will be little change in the present pattern of land development in the future. The Northeast Bronx should remain predominantly residential in character. The small industrial areas scattered throughout the Northeast Bronx should experience moderate growth. The present structures on developed parcels are, for the most part, sound and are not likely to be redeveloped. Future development probably will take place on what is now unencumbered parcels of land such as the vacant areas along the Penn Central right-of-way which will probably become residential due to zoning restrictions. The undeveloped 83-acre site at the intersection of the New England Thruway and the Hutchinson River Parkway could become a major retail center and possibly a residential development.

d. Population

According to the 1970 Census, the population of the study area is about 422,000 people. It is estimated that the 1973 population is about 458,000 people. This increase of about 36,000 people is due primarily to the completion and full occupancy of Co-op City.

The residents of the Northeast Bronx are basically White and middle income. However, there are areas of upper income residents along the shore of Eastchester Bay in the Country Club neighborhood, and areas of non-white residents along the western edge of the study area in the West Farms and Williamsbridge neighborhoods.

Over the past twenty years, population growth has taken place primarily in the northern half of the study area. It is in the northern parts of the study area that future growth is anticipated. In the southern half of the study area, the population has remained stable. It is estimated that the population growth of the Northeast Bronx over the next twenty years will be approximately 61,000 people. Thus, it is projected that by the end of the century, about 519,000 people will be living in the study area. This projection was developed by applying growth factors to the population data of the 1970 Census and by estimating the population potential at each of 26 sites throughout the study area listed for development by the Bronx Office of the Department of City Planning. The patronage of the subway system under each of the proposals was based on these population projections.

Present Transportation System

The transportation system as it exists today in the study area is ubiquitous. Residents of the Northeast Bronx have a choice among modes of transportation when they make trips. The extent of the services offered by each mode are discussed in this section which is presented as follows:

- a. Rail Rapid Transit;
- b. Express Bus Transit;
- c. Local Bus Transit;
- d. Other Transit; and
- e. Automotive Transportation
- f. Analysis

a. Rail Rapid Transit

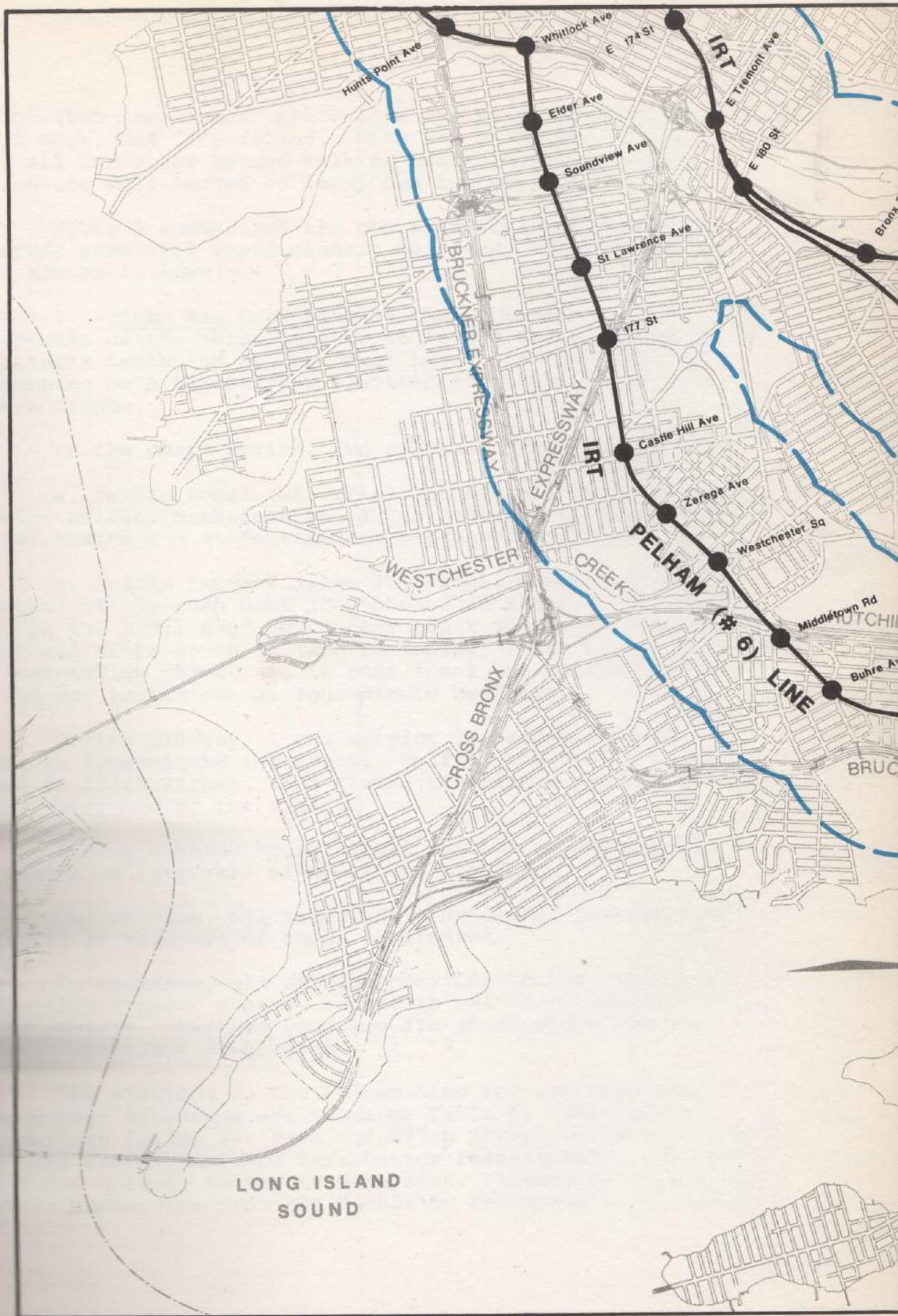
There are three rail rapid transit facilities in the Northeast Bronx, providing high capacity, trunk line transportation service between the study area and Manhattan and the Southern Bronx. All three facilities are operated by the New York City Transit Authority (NYCTA). The fare is almost exclusively collected in tokens, at turnstiles, except as noted.

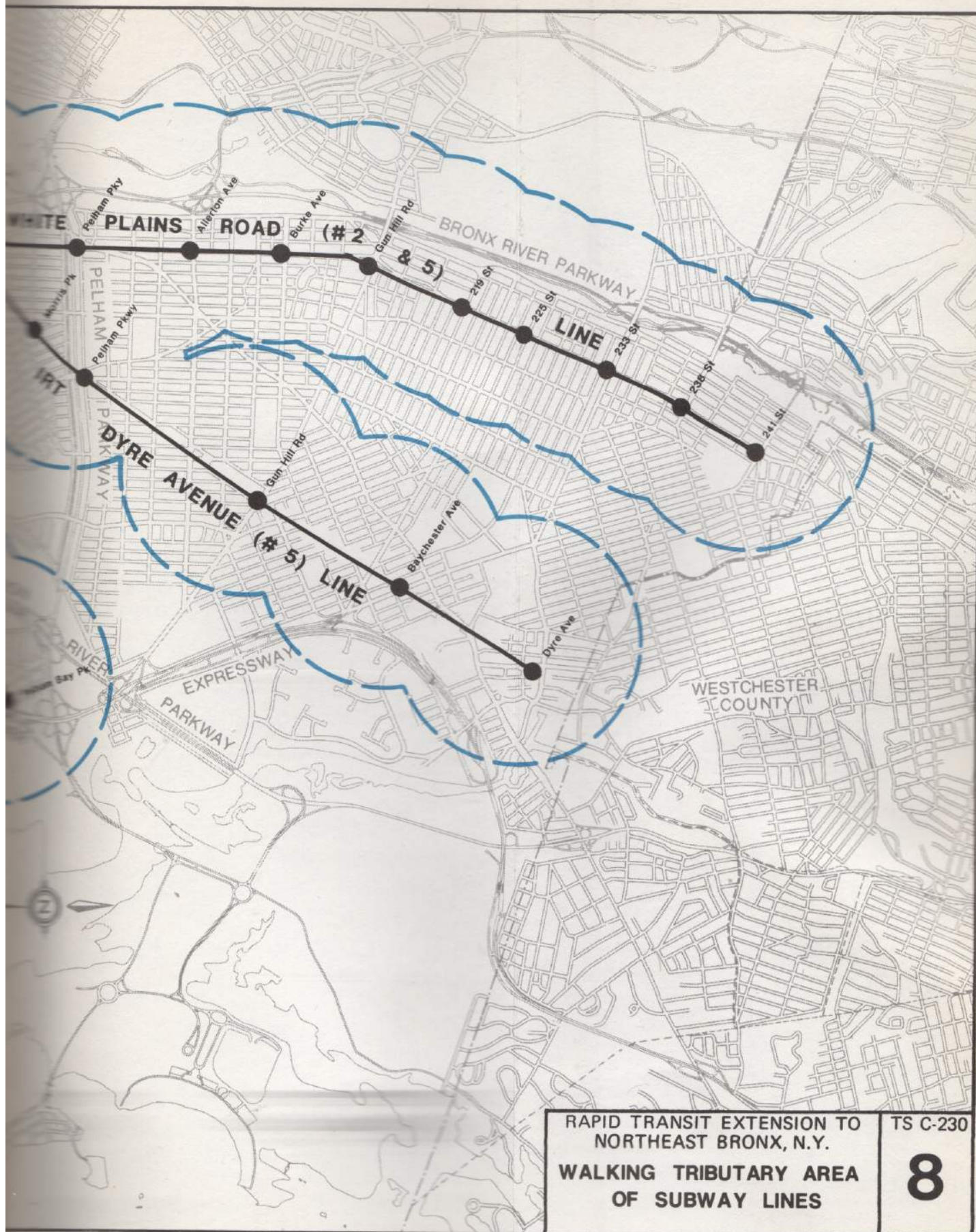
The rail rapid transit facilities are as follows:

1. Pelham Bay Park Line;
2. Dyre Avenue Line; and
3. White Plains Road Line.

Figure 39 shows these lines and their stations.

The maximum distance that most people will walk to a subway station defines the "walking tributary area" of subway lines. Under the existing fare structure a commonly accepted standard for maximum walking distance is about one-half mile. The unshaded area in Figure 8 represents the subway lines' walking tributary area. It can be seen that most of the study area is within walking distance of a subway station. Under the present fare structure, this is the "one-fare" zone. The primary areas which are not within walking distance of a subway





station (two-fare zones) are Pelham Bay Park, Co-op City, Throgs Neck, and City Island. With the exception of the Park, all the areas beyond walking distance from a subway station are well served by local bus routes.

Table 5 summarizes the operating characteristics of the study area rail rapid transit services. Details of the lines are as follows:

1. Pelham Bay Park Line is the southernmost and easternmost of the three lines. It is the Bronx extension of Manhattan's Lexington Avenue Local Line. In the study area it operates on a three-track elevated structure above Westchester Avenue.

In the peaks period, two services are offered:

a. Pelham Local (#6 Train), making all stops between Brooklyn Bridge, Manhattan and 177th Street, The Bronx. The ten-car trains run at four-minute headways; and

b. Pelham Express (also #6 Train), which runs in the direction of the rush hour (Southbound in the A.M. and Northbound in the P.M.) over the center track south of 177th Street, making all stops north of (and including) 177th Street. In the counterflow direction, it runs local the entire distance. The ten-car trains run at four-minute headways.

During mid-day, local service is provided by ten-car trains at five-minute intervals. Half of the trains are short-turned at 177th Street, thus giving ten-minute headway service to the outer end of the line.

During evening hours, local service is provided by six-car trains at intervals of about ten minutes.

Owl service, all local, is provided by six-car trains operating at headways of about 20 minutes.

On weekdays, all service provided in the study area is local, with ten-car trains, except in owl hours when six-car trains operate. Daytime headways are about eight minutes; owl headways are about 20 minutes.

The stations on the Pelham Line and typical daily and AM peak hour patronage are shown on Table 6. The busiest stations are Pelham Bay Park and 177th Street which serve Co-op City (via feeder bus) and Parkchester respectively, each with over 2,500 patrons in the AM peak hour. Soundview Avenue, which receives passengers from the Soundview Peninsula by feeder bus

TABLE 5

CHARACTERISTICS OF EXISTING STUDY AREA RAIL RAPID TRANSIT SERVICE

	Pelham Line		Dyre Avenue Line		White Plains Road Line	
	Express (#6)		Thru Service (#5)		7th Avenue Express (#2)	
	Local (#6)			Shuttle (SS)		Lexington Avenue Thru Express (#5)
<u>Weekday Headways</u> (minutes)						
Peak Periods	4	4	8	-	6	8
Midday	5	-	10	-	10	-
Evening	10	-	12	-	12	-
Owl	20	-	-	40	20	-
<u>Weekend Headways</u> (minutes)						
Saturdays	8	-	10	-	10	-
Sundays	8	-	12	-	12	-
Owl	20	-	-	40	20	-
<u>Weekday Consists</u> (Cars)						
Peak Periods	10	10	10	-	10	10
Midday	10	-	10	-	10	-
Evening	6	-	10	-	6	-
Owl	6	-	-	10	6	-
<u>Weekend Consists</u> (Cars)						
Saturdays	10	-	10	-	10	-
Sundays	10	-	10	-	10	-
Owl	6	-	-	10	6	-
Approx. Schedules Run Times from northern terminal to 42nd Street, Manhattan (minutes)	41	37	48	-	49	43

Source: NYCTA Operating Schedules in effect in late 1973.

TABLE 6

PELHAM BAY LINE
STUDY AREA STATIONS & PATRONAGE

Station	Approximate Patronage	
	Typical Day	Typical AM Peak Hour
Pelham Bay Park	7,850	2,560
Buhre Avenue	3,580	1,170
Middletown Road	1,640	530
Westchester Square	4,460	1,450
Zerega Avenue	1,520	500
Castle Hill Avenue	4,500	1,470
177th Street	9,110	2,970
St. Lawrence Avenue	3,760	1,230
Soundview Avenue	7,460	2,430
Elder Avenue	5,470	1,780

Source: Derived from New York City Transit Authority
Transit Record data for FY 1973

from outside the study area is used by about 2,500 patrons in the AM peak hour. These three stations account for about half the patronage on the Pelham Line in the study area.

Typical scheduled run times to 42nd Street, Manhattan are as follows:

<u>From</u>	<u>via Express</u>	<u>via Local</u>
Pelham Bay Park	37 minutes	41 minutes
177th Street	30 minutes	36 minutes

2. The Dyre Avenue Line runs through the middle of the study area from the southwest to the northeast. Its two tracks use the four track right-of-way of the former New York, Westchester and Boston Railroad. The right-of-way is mostly on grade or in cut section except at the northern end, where it is on an embankment.

Except in owl hours, the line is served by the Lexington Avenue Express (#5 Train) to and from Manhattan and Brooklyn. The headways are as follows:

- a. In peak periods, approximately eight minutes;
- b. During midday and Saturdays, ten minutes; and
- c. Evening hours and Sundays, twelve minutes.

During owl hours, a shuttle (SS Train) operates between Dyre Avenue and 180th Street (where a transfer can be made to through trains to and from Manhattan). The headways vary to a maximum of about 40 minutes. During this period the stations are not attended and the fares are collected by the conductor on the train.

The stations on the Dyre Avenue Line and typical daily and AM peak hour patronage are shown on Table 7. The busiest station on the line is Gun Hill Road, which is used by 1,300 people in the AM peak hour. This is about half the number of people served at busy stations on the Pelham Line. All other stations could be considered lightly used.

The approximate scheduled run times are as follows:
From Dyre Avenue to 42nd Street, Manhattan, 48 minutes; to 180th Street, 11 minutes.

3. The White Plains Road Line generally runs above White Plains Road, near the western edge of the study area, on a three track elevated structure. The route is served basically by a Seventh Avenue Express (#2 Train) providing through service to

TABLE 7

DYRE AVENUE LINE
STUDY AREA STATIONS & PATRONAGE

Station	Approximate Patronage	
	Typical Day	Typical AM Peak Hour
Dyre Avenue	2,580	800
Baychester Avenue	2,140	670
Gun Hill Road	4,330	1,340
Pelham Parkway	1,840	570
Morris Park	1,310	400

Source: Derived from New York City Transit Authority
Transit Record data for FY 1973

and from Manhattan and Brooklyn. These trains make all stops to 96th Street, Manhattan. In the peak period, this service is supplemented by the Lexington Avenue Thru Express (#5 Train) which makes all stops between 241st Street and 180th Street and then runs non-stop between 180th Street and 149th Street-Third Avenue in the rush-hour direction. These services are provided as follows:

a. In the peak periods, the ten-car Seventh Avenue Expresses are at six-minute intervals, and the ten-car Lexington Avenue Thru Expresses are at about eight-minute intervals;

b. During midday, Seventh Avenue service is provided at ten-minute intervals by ten-car trains;

c. During evening hours, Seventh Avenue service is provided at 12-minute intervals by six-car trains; and

d. In owl hours, there is 20-minute headway service provided by six-car trains.

Outside of the rush-hours, when no direct service is provided to the east side of Manhattan, passengers can transfer to Lexington Avenue trains at 180th Street or 149th Street-Grand Concourse.

The stations on the White Plains Road Line, and typical patronage data are shown on Table 8.

The busiest stations on this line are 241st Street, 233rd Street, Gun Hill Road, Allerton Avenue and Pelham Parkway, all with typical AM peak hour volumes of over 900 patrons. Although the individual station volumes are low compared to the high-volume stations of the Pelham Line, it is significant that half of the study-area stations on this line serve a significant number of passengers.

The approximate scheduled run times from 241st Street to 42nd Street, Manhattan are as follows: Seventh Avenue Express, 49 minutes; Lexington Avenue Thru Express, 43 minutes.

b. Express Bus Transit

Express bus transit routes provide medium capacity, one-seat service between the study area and midtown Manhattan. These services began operating in the early 1970's, and are relatively well patronized. The routes provide air-conditioned, direct bus services along four routes in the study area. The fares currently are \$1.25, one way, exact change.

TABLE 8

WHITE PLAINS ROAD LINE
STUDY AREA STATIONS AND PATRONAGE

Station	Approximate Patronage	
	Typical Day	Typical AM Peak Hour
241st Street	4,080	970
238th Street	1,980	470
233rd Street	3,980	940
225th Street	3,350	790
219th Street	2,550	600
Gun Hill Road	4,060	960
Burke Avenue	2,630	620
Allerton Avenue	3,860	916
Pelham Parkway	4,890	1,160
Bronx Park East	1,430	340

Source: Derived from New York City Transit Authority
Transit Record data for FY 1973.

These services provide an alternative to subway or feeder bus-subway service for Bronx-Manhattan travelers. Figure 9 is a map showing the routes of the express buses and their stops. Table 9 summarizes the operating characteristics of these services on weekdays.

Details of the routes follow:

1. Parkchester - Manhattan (BxM6) is operated by New York Bus Service, Inc. The service started August 23, 1970. The two pick-up and discharge points in the Parkchester development are at Metropolitan Oval and at Metropolitan Avenue at Hugh Grant Circle.

Weekday headways are indicated on Table 9. Saturday service is provided approximately every 30 minutes throughout the day. Sunday and holiday service is provided hourly throughout the day.

In Manhattan, the following stops are made:

Southbound at:

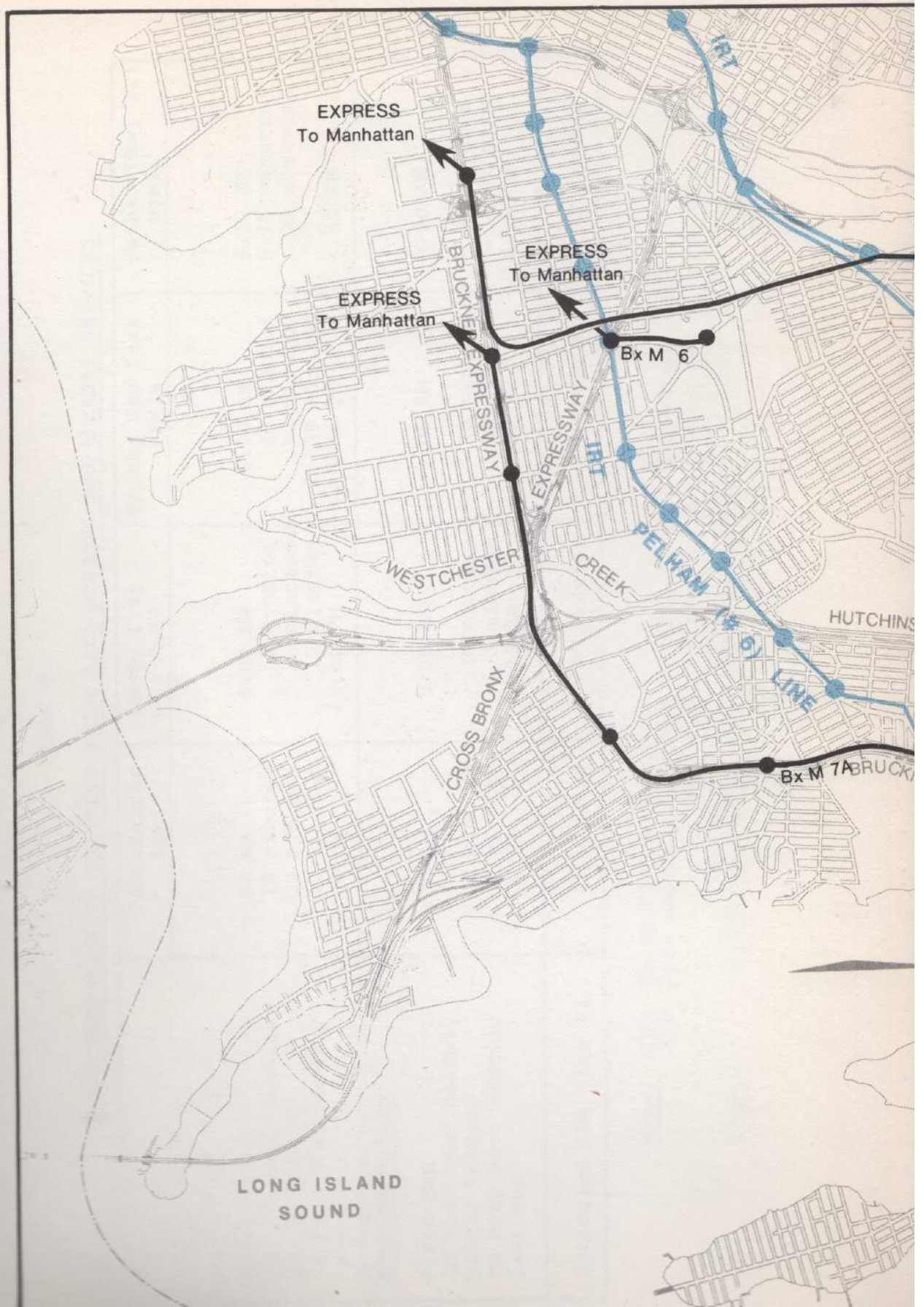
85th Street at Fifth Avenue
57th Street at Fifth Avenue
50th Street at Fifth Avenue
42nd Street at Fifth Avenue
34th Street at Fifth Avenue
23rd Street at Fifth Avenue

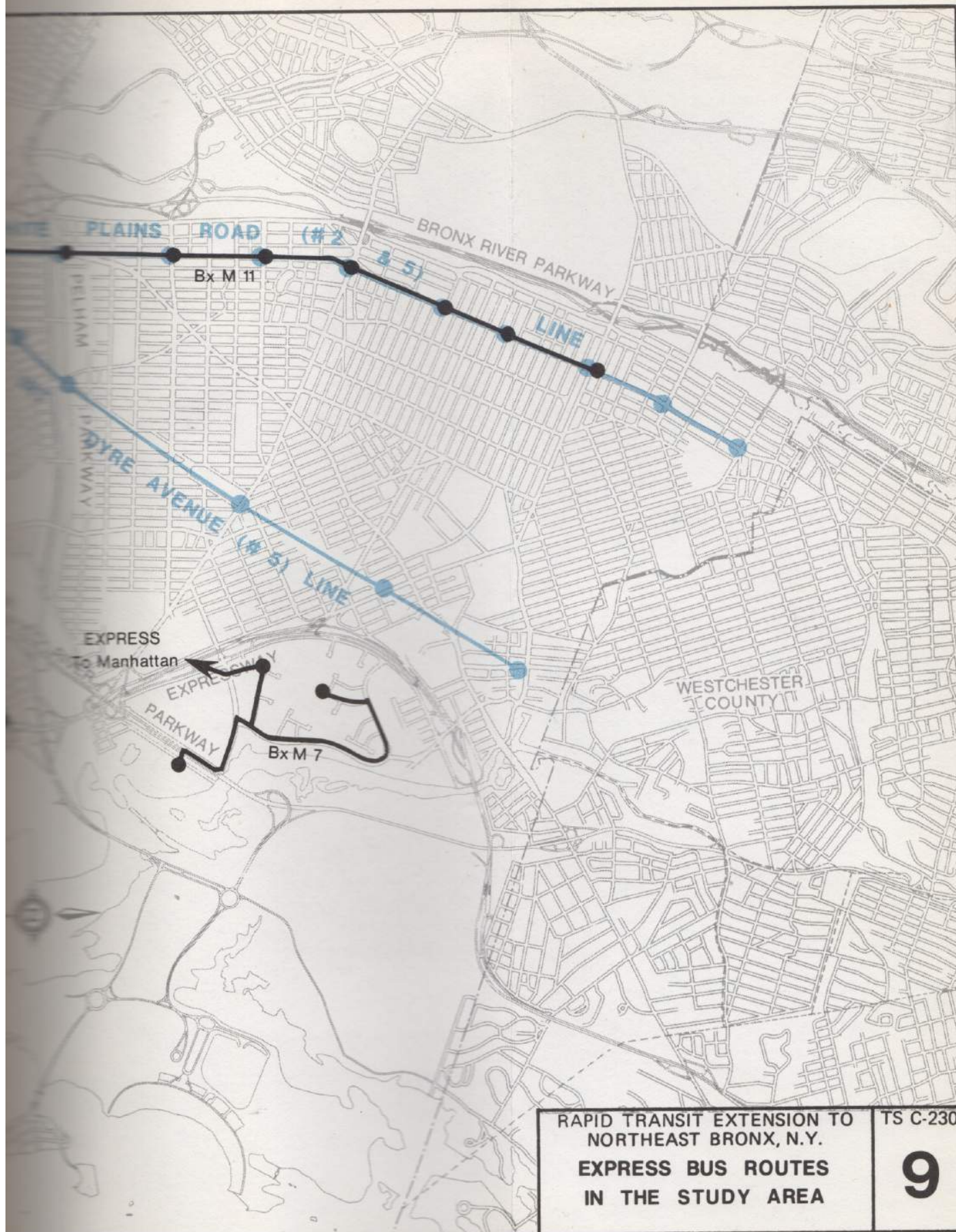
Northbound at:

24th Street at Madison Avenue
35th Street at Madison Avenue
43rd Street at Madison Avenue
51st Street at Madison Avenue
58th Street at Madison Avenue
86th Street at Third Avenue

On a typical weekday this route has a patronage of about 2,800. About 1,100 people ride the 20 southbound trips in the AM peak period (6:30 AM to 8:30 AM) and about 1,250 people ride the 27 northbound trips in the PM peak period (4:00 PM to 6:00 PM);

2. Co-op City - Manhattan (BxM7) is operated by New York Bus Service, Inc. The Service started January 18, 1971. There are three pick-up and discharge points in the Co-op City development as follows:





RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
**EXPRESS BUS ROUTES
IN THE STUDY AREA**

TS C-230

9

TABLE 9

CHARACTERISTICS OF EXISTING STUDY AREA EXPRESS BUS WEEKDAY SERVICES

	Parkchester BxM6	Co-Op City BxM7	Pelham Bay Park BxM7a	Pelham Pkwy (1) BxM11
<u>From Bronx</u>				
First Bus	6:30 AM	5:00 AM	6:30 AM	6:30 AM
AM Peak Hour Headway	15 minutes	2 minutes	15 minutes	10-15 minutes
Midday Headway	30 minutes	30 minutes	30 minutes	30 minutes
PM Peak Hour Headway	30 minutes	15 minutes	15-30 minutes	-
Last Bus	10:00 PM	10:00 PM	8:30 PM	4:30 PM
<u>From Manhattan</u>				
First Bus	9:00 AM	9:00 AM	9:00 AM	9:00 AM
AM Peak Hour Headway	-	-	-	-
Midday Headway	30 minutes	30 minutes	30 minutes	30 minutes
PM Peak Hour Headway	15 minutes	3 minutes	15 minutes	5-10 minutes
Last Bus	11:00 PM	11:00 PM	9:30 PM	10:30 PM
Scheduled Run Time (2)	45 minutes	45 minutes	45 minutes	45 minutes

Note: (1) White Plains Road.

(2) From northern terminal to 57th Street, Manhattan.

Source: Public Timetables in effect late 1973.

- a. Dreiser Loop and De Kruif Place;
- b. Einstein Loop; and
- c. Asch Loop and Alcott Place.

In the morning, there is non-stop service to Manhattan from each location. At other times, the buses make all stops before departing for Manhattan. All buses from Manhattan make all three stops in the development. Table 9 shows weekday headways. Saturday service is provided approximately every 30 minutes throughout the day. Sunday and holiday services are provided hourly throughout the day.

The Co-op City route makes the same stops in Manhattan as does the Parkchester route.

On a typical weekday, this route has a patronage of over 4,000. About 1,800 people ride the 35 trips in the AM peak period (6:30 AM to 8:30 AM) and about 2,500 people ride the 39 northbound trips in the PM peak period (4:00 PM to 6:00 PM);

3. Pelham Bay Park - Manhattan (BxM7a) is operated by New York Bus Service, Inc. The service started January 10, 1972. The route's northern terminal is at the Pelham Bay Park subway station (#6 Train). Buses make the stops along Bruckner Boulevard at Jarvis Avenue, East Tremont Avenue, Castle Hill Avenue, and White Plains Road.

Headways on weekdays as indicated on Table 9. Saturday service is provided hourly throughout the day. There is no Sunday service. This route makes the same stops in Manhattan as the Parkchester and Co-op City - Manhattan routes.

On a typical weekday, this route has a patronage of about 2,100. About 800 people ride the 18 southbound trips in the AM peak period (6:30 AM to 8:30 AM) and about 1,700 people ride the 24 northbound trips in the PM peak period (4:00 PM to 6:00 PM); and

4. Pelham Parkway (White Plains Road) - Manhattan (BxM11) is operated by Pelham Parkway Bus Service, Inc. The service started April 26, 1971. The buses make the following stops in the study area along White Plains Road: 232nd Street; 225th Street, 219th Street, Gun Hill Road, Burke Avenue, Allerton Avenue and Pelham Parkway.

A stop is also made at Bruckner Boulevard and Stratford Avenue, outside the study area.

Weekday headways are shown on Table 9. Saturday service is provided approximately at one-hour intervals throughout the day. There is no Sunday service.

In Manhattan buses stop southbound along Fifth Avenue and northbound along Madison Avenue at 26th Street, 36th Street, 43rd Street, 51st Street, and 59th Street.

This service is patronized by about 3,000 riders per weekday and about 500 on Saturday. The PM peak period patronage is heavier than the AM peak period patronage.

One other service which is express in nature, Fordham Road-Stamford Express (Route 61), is described later in this chapter in Section (d) with the other Westchester County Buses.

c. Local Bus Transit

Local Bus transit routes provide intra-Bronx transit service and feeder service to subways. The local bus routes in the Northeast Bronx form an extensive grid network over the study area. Figure 10 shows the local bus network. Using a commonly accepted standard that local bus passengers will walk up to about 0.2 miles to a bus, Figure 10 shows that the local bus network is so dense that almost all parts of the study area are within walking distance of a bus line. The unshaded area of the figure represents that portion of the study area that is within walking distance of a local bus route. The only significant areas shaded (beyond walking distance) are parts of Pelham Bay Park.

Within the study area there are 26 local bus routes. All but three are operated by the Manhattan and Bronx Surface Transit Operating Authority (MaBSTOA); a subsidiary of the NYCTA. The three not operated by MaBSTOA are the Q44, operated by the NYCTA, the QBx1, operated by Queens Transit and the 60 operated by Westchester Street Transportation.

There are no free (or reduced fare) transfers in the study area except for the transfer between the Third Avenue El Replacement Service (Bx55) and the subway station at Gun Hill and White Plains Roads. This free transfer exists as a replacement of the free transfer that existed between the Third Avenue El (now being demolished) and the White Plains Road Line.

The approximate headway of all routes and their terminals are shown on Table 10. The hours of operations of each route can be approximated by referring to this table. Bus stops are located approximately every 500 feet along each local bus route in the study area.

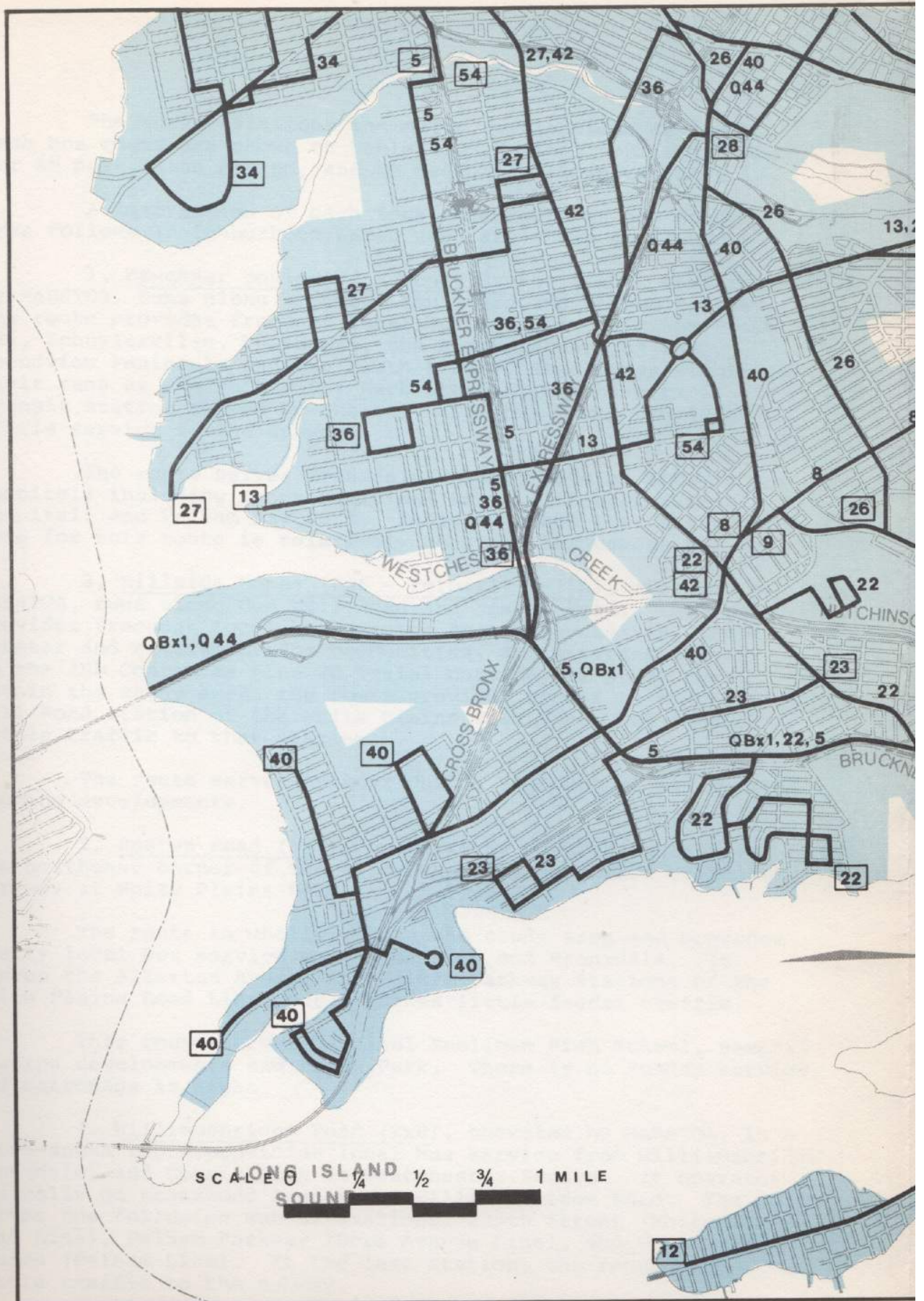
TABLE 10

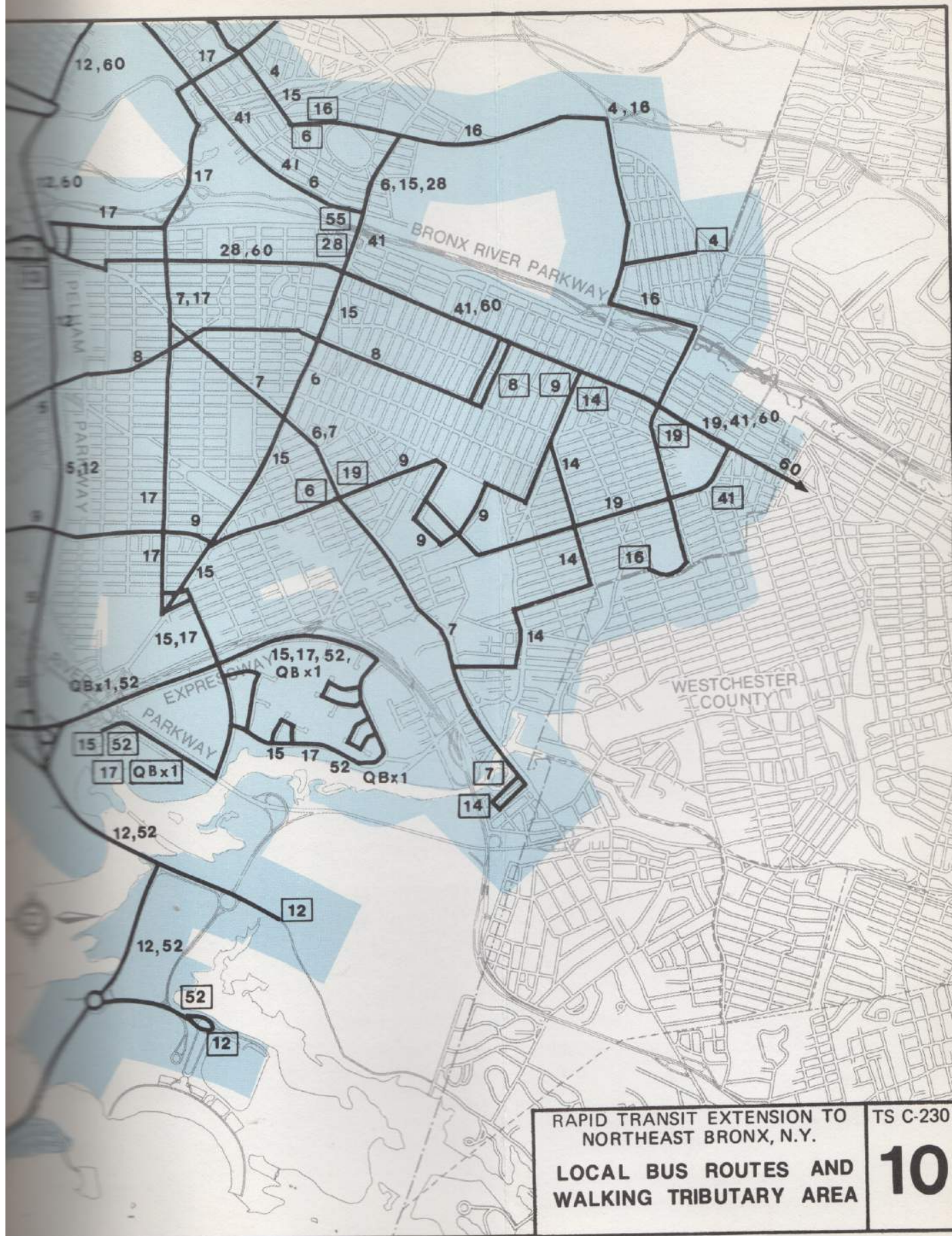
CHARACTERISTICS OF EXISTING STUDY AREA LOCAL BUS SERVICES

Route Number	Weekday Headways					Saturday Headways					Sunday Headways					Terminals	Terminals
	8:00 AM	Noon	PM	5:30 PM	9:00 AM	8:00 AM	Noon	PM	5:30 PM	9:00 AM	8:00 AM	Noon	PM	5:30 PM	9:00 AM		
Bx5	7	12	7	30	-	60	12	12	30	-	-	15	15	-	-	Pelham Pkwy - Jacobel Hosp Westchester Ave - Bainbridge Ave - 206 St*	Southern Blvd - Westchester Ave - 206 St*
Bx6	4	14	6	22	-	14	16	17	22	-	14	14	14	20	-	Boston Rd - Corsa Ave	Bainbridge Ave - 206 St*
Bx7	60	60	60	60	-	-	60	60	-	-	-	-	-	-	-	Pelham Pkwy So - White Plains Rd	Pelham Pkwy So - White Plains Rd
Bx8	13	15	15	30	-	30	30	30	30	-	60	30	30	30	-	White Plains Rd - 225 St	Westchester Square
Bx9	7	12	7	18	-	20	14	10	18	-	30	20	15	24	-	White Plains Rd - 233 St	Westchester Square
Bx12	2	3	2	10	50	6	3	3	10	50	8	5	5	10	50	207 St - Broadway*	207 St - Broadway*
Bx13	3	7	4	12	60	10	10	8	15	60	20	16	10	15	60	White Plains Rd - Pelham Pkwy	Castle Hill Pk*
Bx14	15	24	15	48	-	48	48	48	48	-	-	48	48	-	-	233 St - Pelham Pkwy	233 St - Pelham Pkwy
Bx15	3	6	3	15	40	14	16	17	18	40	12	12	12	16	40	Co-op City	White Plains Rd - Valentine Ave-192 St*
Bx16	6	15	7	16	-	40	22	16	40	-	46	24	24	40	-	Mundy Lane - Pitman Ave	Bainbridge Ave - 206 St*
Bx17	6	12	6	15	-	30	16	16	22	-	30	24	24	30	-	Co-op City	Bedford Pk Blvd - Paul Ave*
Bx19	40	-	40	-	-	-	-	-	-	-	-	-	-	-	-	Valentine Ave-192 St*	Valentine Ave-192 St*
Bx22	15	25	16	30	-	30	18	18	30	-	30	18	18	30	-	White Plains - 241 St	Boston Rd - Eastchester Rd
Bx23	13	36	18	36	-	30	18	18	30	-	30	18	18	30	-	Research Ave - Ampere Ave	Eastchester Square
Bx26	4	6	4	12	40	6	8	8	10	40	16	10	8	16	40	Crosby Ave - Westchester Ave	Ellsworth & Schley Ave
Bx27	3	6	3	10	40	10	6	6	18	40	14	10	10	18	40	Eastchester Rd - Sackett Ave	137 St - Lincoln Ave*
Bx28	8	16	12	48	-	45	16	16	24	-	40	25	16	22	-	Soundview Ave - Clason Pt*	Westchester Ave - Southern Blvd*
Bx36	4	6	4	12	50	8	8	8	12	50	12	10	8	12	50	205 St - Goulden Ave*	West Farms Square *
Bx40	3	6	3	12	40	8	7	7	10	40	12	10	9	10	40	181 St - Wadsworth Ave*	Pugsley & Randall Aves*
Bx41	5	6	5	12	-	10	8	6	10	-	14	12	8	15	-	Manhattan	Bruckner Blvd - Zerega Ave
Bx42	2	4	4	10	-	6	4	4	10	-	12	8	8	10	-	Burnside Ave - Sedgewick Ave*	Throgs Neck Peninsula*
Bx52	-	35	35	-	-	-	35	35	-	-	-	35	35	-	-	241 St - Baychester Ave	136 St - Lincoln Ave*
Bx54	7	12	7	30	-	60	12	12	30	-	-	-	-	-	-	Westchester Square	Westchester & Third Aves*
Bx55	1	3	1	4	20	4	3	3	6	20	4	4	3	6	20	Orchard Beach	Co-op City
Q44	6	15	6	20	60	15	8	8	15	60	30	15	15	20	60	Purdy St - Parkchester	Southern Blvd - Westchester Ave
Q8x1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	White Plains & Gun Hill Rds	3rd Ave - 149 St*
60	30	30	30	30	-	60	30	30	60	-	-	-	-	-	-	West Farms Square *	161 St - River Ave*
																165 St Terminal	165 St Terminal
																Jamaica, Queens*	Jamaica, Queens*
																Main St - Flushing, Queens*	Main St - Flushing, Queens*
																Fordham Rd - Valentine Ave*	Fordham Rd - Valentine Ave*

NA Not Available
* Outside Study Area

Note: Headways, given in minutes, are approximate times between buses on the main section of each route based on schedules in effect in early 1976.





The subway stations and major institutions served by each bus route are shown on Table 11. Typical hourly volumes for AM peak, Base Period, and PM peak, are shown on Table 12.

A description of each local bus route in the study area follows (neighborhood names used are shown on Figure 4):

1. Bruckner Boulevard - Story Avenue (Bx5), operated by MaBSTOA, runs along Bruckner Boulevard and Pelham Parkway. The route provides frequent local bus service to Pelham Parkway, Schuylerville, Unionport, the northern part of the Soundview Peninsula and the South Bronx. Some buses terminate their runs at the Pelham Bay Park Station, the only rapid transit station served by the Bx5. The bus route provides little service to the subway.

The route serves Bronxdale Houses, several schools and hospitals including Bronx Municipal Hospital Center (Jacobi Hospital) and Pelham Bay Park. Table 12 shows that the patronage for this route is relatively constant throughout the day.

2. Hillside Homes (Bx6 - formerly Bx15A), operated by MaBSTOA, runs along Gun Hill Road and Boston Road. The route provides frequent local bus service to the Baychester, Eastchester and Williamsbridge communities, and provides access to the IND Concourse Line (D Train) outside the study area. Within the study area, the route provides access to the Gun Hill Road station of the White Plains Road Line, but feeds little traffic to that station.

The route serves Evander Childs High School and several housing developments.

3. Boston Road (Bx7), operated by MaBSTOA, runs from the northeast corner of the study area southwestward to Pelham Parkway at White Plains Road.

The route is wholly within the study area and provides hourly local bus service to Eastchester and Bronxdale. It serves the Allerton Avenue and Pelham Parkway Stations of the White Plains Road Line, but provides little feeder traffic.

This route serves Cardinal Spellman High School, several housing developments and Bronx Park. There is no Sunday service, and patronage is light.

4. Williamsbridge Road (Bx8), operated by MaBSTOA, is a north-south route providing local bus service from Williamsbridge, Bronxdale, and Morris Park to Westchester Square. It operates basically on Bronxwood Avenue and Williamsbridge Road. The route serves the following subway stations: 225th Street (White Plains Road Line), Pelham Parkway (Dyre Avenue Line), and Westchester Square (Pelham Line). At the last station, the route feeds little traffic to the subway.

TABLE 11

SUBWAY STATIONS AND MAJOR INSTITUTIONS SERVED BY LOCAL BUS ROUTES

Route Number	Subway Stations	Housing Developments	Schools	Hospitals	Major Parks
Bx 5	Pelham Bay Pk Pelham Pkwy (Dyre)	Bronxdale Houses	Mother Butler Memorial HS St. Catherine Academy	Bronx Municipal Hospital Center Pelham Bay General Hospital	Bronx Park
Bx 6	Gun Hill Rd (WPR)	Hillside Homes Eastchester Gardens Gun Hill Houses	Evander Childs HS		Bronx Park
Bx 7	Baychester Ave Allerton Ave Pelham Pkwy (WPR)	Hillside Homes Pelham Pkwy Houses Parkside Houses Eastchester Gardens Boston-Secor Houses	Cardinal Spellman HS		
Bx 8	Pelham Pkwy (Dyre) 225 St Westchester Square	Pelham Pkwy Houses A Einstein College of Medicine Staff Housing	Yeshiva University-Einstein College of Medicine Evander Childs HS Christopher Columbus HS Herbert Lehman HS Our Savior Lutheran HS St. Catherine Academy	Bronx Municipal Hospital Center Misericordia Hospital A. Einstein College of Medicine Hospital	
Bx 9	233 St Westchester Square	Edenwald Houses Hillside Homes A. Einstein College of Medicine Staff Housing	Yeshiva University-Einstein College of Medicine Herbert Lehman HS Cardinal Spellman HS Mother Butler Memorial HS		Pelham Bay Park
Bx 12	Pelham Pkwy (WPR) Morris Pk Pelham Pkwy (Dyre) Pelham Bay Pk	Pelham Pkwy Houses	Christopher Columbus HS Mother Butler Memorial HS St. Catherine HS Academy	Bronx Municipal Hospital Center Pelham Bay General Hospital	Bronx Park
Bx 13	Pelham Pkwy (WPR) Bronx Pk E Castle Hill Ave	Parkchester	St. Raymond's Boys' HS St. Raymond's Girls' Academy	Misericordia Hospital	Bronx Park
Bx 14	Dyre Ave 233 St	Boston-Secor Houses	Evander Childs HS Harry S. Truman HS		Bronx Park
Bx 15	Gun Hill Rd (WPR) Gun Hill Rd (Dyre)	Co-op City Eastchester Gardens Gun Hill Houses Boston-Secor Houses	Mt St Michael HS Harry S. Truman HS		Bronx Park
Bx 16 Bx 17	238 St Allerton Ave	Co-op City Parkside Houses Boston-Secor Houses			Bronx Park

TABLE 11 (CONTINUED)
SUBWAY STATIONS AND MAJOR INSTITUTIONS SERVED BY LOCAL BUS ROUTES

Route Number	Subway Stations	Housing Developments	Schools	Hospitals	Major Parks
Bx 19	241 St 238 St	Edenwald Houses Hillside Homes	Cardinal Spellman HS Mt St Michael HS	Bronx State Hospital Pelham Bay General Hospital	
Bx 22	Pelham Bay Pk Buhre Ave Middletown Rd Westchester Square		Herbert Lehman HS		
Bx 23	Buhre Ave	A. Einstein College of Medicine Staff Housing	Yeshiva University-Einstein College of Medicine Our Savior Lutheran HS	A Einstein College of Medicine Hospital	Bronx Park
Bx 26			James Monroe HS		
Bx 27	Soundview Ave Elder Ave	Bronxdale Houses			Bronx Park
Bx 28	Gun Hill Rd (WFR) Burke Ave Allerton Ave Pelham Pkwy (WFR) Bronx Pk E	Pelham Pkwy Houses Parkside Houses Gun Hill Houses			
Bx 36	177 St	Parkchester Bronxdale Houses Bronx River Houses	James Monroe HS	Westchester Square Hospital	
Bx 40	Westchester Square	Parkchester	Herbert Lehman HS St Raymond's Boys' HS St Raymond's Girls' Academy		Bronx Park
Bx 41	241 St 238 St 233 St 225 St 219 St Gun Hill Rd (WFR)	Gun Hill Houses		Misericordia Hospital	
Bx 42	Westchester Square Zerega Ave Castle Hill Ave 177 St St Lawrence Ave Soundview Ave Elder Ave	Parkchester	Herbert Lehman HS James Monroe HS	Parkchester General Hospital	
Bx 52		Co-op City Boston-Secor Houses	Harry S. Truman HS		Pelham Bay Park
Bx 54	177 St	Parkchester Bronxdale Homes	St Raymond's Boys' HS St Raymond's Girls' Academy	Westchester Square Hospital	Bronx Park
Bx 55	Gun Hill Rd (WFR)	Gun Hill Houses			
Q 44	177 St	Parkchester Bronx River Houses			
QBx1	Pelham Bay Park (Pelham)	Co-op City	Harry S. Truman HS	Pelham Bay General Hospital	
60		Hillside Homes Pelham Pkwy Houses Parkside Houses Eastchester Gardens Boston-Secor Houses			

Abbreviations: HS = high school
WFR = White Plains Road Line

TABLE 12

TYPICAL HOURLY VOLUMES FOR LOCAL BUS ROUTES

Route Number	Typical Hourly Volumes		
	AM Peak Hour	Base Period	PM Peak Hour
5	746	527	809
6	457	252	367
7	48	28	18
8	482	355	295
9	968	533	755
12	3,538	2,591	2,930
13	1,307	778	1,231
14	301	113	82
15	1,488	1,040	1,548
16	691	72	433
17	667	709	743
19	NA	NA	NA
22	182	83	200
23	286	26	113
26	2,244	1,246	1,758
27	1,196	657	1,476
28	316	249	221
36	1,935	1,062	2,057
40	3,093	1,571	3,527
41	2,416	1,351	2,338
42	2,096	1,982	2,412
52	—	—	—
54	NA	NA	NA
55	1,195	602	836
Q44	1,597	1,538	1,419
QBx1	NA	NA	NA
60	NA	NA	NA

Source: MaBSTOA Trip Sheets for various typical days in Fall 1973 and Spring 1974

Notes: AM Peak Hour for trips starting 7:00 AM to 8:00 AM
 Base Day Hour for trips starting Noon to 1:00 PM
 PM Peak Hour for trips starting 5:00 PM to 6:00 PM
 NA — not available
 Route 52 operates only in summer

The route serves several high schools and housing developments. The patronage on the route is relatively stable during the day.

5. Eastchester Road (Bx9), operated by MaBSTOA, is a north-south route operating basically along Eastchester Avenue. It provides frequent local bus service from Baychester, Eastchester and Edenwald to Westchester Square. The route serves the 233rd Street Station of the White Plains Road Line and the Westchester Square Station of the Pelham Line. At the latter station, it feeds some traffic to the subway.

The route serves several hospitals, housing developments and schools including Yeshiva University-Einstein College of Medicine, its hospital and housing complexes and Bronx Municipal Hospital Center (Jacobi Hospital).

The patronage on the route is about average for bus routes in the study area.

6. Fordham Road - City Island (Bx12), operated by MaBSTOA, provides major east-west local bus service across the study area, giving access to City Island and the 207th Street Terminal of the IND Subway (A Train), Manhattan. Operating along Pelham Parkway, the route provides extremely frequent service to Orchard Beach, Pelham Bay Park, Baychester and Pelham Parkway. The route serves the following subway stations: Pelham Parkway (White Plains Road Line), Pelham Parkway (Dyre Avenue Line), and Pelham Bay Park (Pelham Line), and provides some feeder traffic to these stations.

The route serves Pelham Parkway Houses, several schools, hospitals and parks including Bronx Park, Pelham Bay Park, and Bronx Municipal Hospital Center (Jacobi Hospital).

This route operates at all times and is heavily used by passengers. In the summer months, special services are operated to Orchard Beach and the Pelham Golf Course, some of which short line from the Pelham Bay Park Station.

7. Castle Hill Avenue (Bx13), operated by MaBSTOA, is a major north-south route between White Plains Road at Pelham Parkway and the Castle Hill area. The well-patronized route provides frequent local bus service to Castle Hill, Parkchester and Morris Park, serving the Bronx Park East and Pelham Parkway Stations of the White Plains Road Line and the Castle Hill Avenue Station of the Pelham Line. It feeds some traffic to the Pelham Parkway Station, and a significant amount of traffic to the Castle Hill Avenue Station. About half of the bus patrons on this route are subway transfers.

The route serves the St. Raymond's Boys' High School and Girls' Academy, several housing developments and Bronx Park. This route operates at all times.

8. Edenwald (Bxl4), operated by MaBSTOA, is an east-west route in the extreme northern end of the study area, near the City Line.

The route is wholly within the study area and provides local bus service to Edenwald and Wakefield. The route serves the 233rd Street Station of the White Plains Road Line and Dyre Avenue Station of the Dyre Avenue Line, but provides little feeder traffic. Misericordia Hospital is served by this route. Patronage on the route is light. Headways, at best, are 15 minutes.

9. Gun Hill Road (Bxl5), operated by MaBSTOA, is a major east-west bus route. It provides access from Co-op City, Eastchester and Williamsbridge to West Bronx subway stations and shopping areas. Within the study area, the route serves the Gun Hill Road Stations on both the White Plains Road and Dyre Avenue Lines, but provides little feeder traffic to these stations.

The route serves several high schools and housing developments including Co-op City. In the study area the route operates at all times at short headways and is well patronized.

10. Webster Avenue (Bxl6), operated by MaBSTOA, connects the Wakefield area to West Bronx subway stations. Within the study area the route serves the 238th Street Station of the White Plains Road Line, and provides some feeder service. The frequency of service is about every six minutes and the patronage is moderate and severely peaked during the peak hour. The route serves Mt. St. Michael High School.

11. Allerton Avenue (Bxl7 - formerly Bxl5C), operated by MaBSTOA, is an east-west route which provides local bus service to Co-op City, Baychester, Bronxdale, and West Bronx subway stations. Within the study area the route serves the Allerton Avenue Station of the White Plains Road Line.

The route serves the Harry S. Truman High School, several housing developments including Co-op City, and Bronx Park. The headways are, at a minimum, six minutes, and the patronage is relatively stable throughout the day.

12. Baychester Avenue (Bxl9 - formerly Bxl5B), operated by MaBSTOA, provides local bus service to Wakefield and Edenwald during weekday peak periods only, and only at 40 minutes headway.

The route serves the 241st and 238th Street Stations of the White Plains Road Line, but provides little feeder traffic.

The route serves Mt. St. Michael High School and several housing developments.

13. Country Club - Spencer Avenue (Bx22), is operated by MaBSTOA, between Westchester Square and the Country Club area. The route serves the following stations on the Pelham Line: Westchester Square, Middleton Road, Buhre Avenue, and Pelham Bay Park. It provides little feeder traffic to the Pelham Bay Park Station.

The route serves Herbert Lehman High School, several hospitals and Pelham Bay Park. Patronage on this route is light, and headways, at best, are 15 minutes.

14. Crosby - Layton Avenue (Bx23), operated by MaBSTOA, is a north-south route in the southeast part of the study area. This route is wholly within the study area and provides local bus service to the Schuylerville and Westchester areas.

The route serves the Buhre Avenue Station of the Pelham Line, but because it is so lightly used, feeds little traffic to the subway. The headways are, at best, 13 minutes.

15. Boston Road (Bx26), operated by MaBSTOA, is an east-west route. In the study area it runs basically along Morris Park Avenue, providing local bus service to the Morris Park area and access to the South Bronx.

The route does not serve any study-area rapid transit stations, but does serve the 180th Street Station of the White Plains Road Line which is just beyond the study area boundary.

The study-area institutions which are served by the route are Yeshiva University-Einstein College of Medicine, its hospital and housing complexes; and Our Saviour Lutheran High School.

The service is operated at all times at frequent headways. Patronage is heavy for the entire route, most of which is outside the study area.

16. Clason Point (Bx27), operated by MaBSTOA, is basically a north-south route to serve the Soundview Peninsula. Primarily the bus feeds traffic from the Soundview Peninsula to the Pelham Line at Soundview Avenue. Within the study area the route provides local bus service along Westchester Avenue to the South Bronx.

The study-area institutions which are served by the route are James Monroe High School and Bronx River Houses.

Service operates at all times except along Westchester Avenue where there is no owl service. Patronage is heavy and headways are very low (three minutes in peak periods).

17. Williamsbridge (Bx28), operated by MaBSTOA, is a north-south line. Within the study area the route provides local bus service to Williamsbridge, Norwood, Bronxdale, Morris Park and Van Nest, following the route of the White Plains Road Line. The route provides access to the West Bronx on both ends of its run.

The route serves the following study-area stations of the White Plains Road Line: Bronx Park East, Pelham Parkway, Allerton Avenue, Burke Avenue and Gun Hill Road, but provides negligible feeder traffic. The route serves Evander Childs High School, several housing developments and Bronx Park. Patronage of this route is light, and headways are, at best, eight minutes.

18. 180th Street Crosstown (Bx36), operated by MaBSTOA, is a major east-west local bus route between Washington Heights, Manhattan and two Bronx terminals: one on the Soundview Peninsula, and the other at Bruckner Boulevard and the Cross-Bronx Expressway.

In the study area, the route provides local bus service to Castle Hill, Parkchester, West Farms, the West Bronx and northern Manhattan.

The Bruckner - Cross-Bronx Branch of the route serves the 177th Street Station of the Pelham Line conveniently. Soundview Branch passengers would have a two-block walk to that station. The route does provide some feeder traffic to the station.

The route serves James Monroe High School and several housing developments, including Parkchester. The route operates at all times, at frequent intervals, and is well patronized.

19. Tremont Avenue (Bx40), operated by MaBSTOA, is a major east-west route across the Bronx. The route provides local service from four terminals on the Throgs Neck Peninsula to Schuylerville, Westchester, Parkchester, and the West Bronx.

The route is a major feeder to the Westchester Square Station of the Pelham Line to and from the Throgs Neck Peninsula. The route serves St. Raymond's Boys' High School and Girls Academy, Parkchester, and Westchester Square Hospital. In the study area, service is operated at all times and at very frequent intervals. It is an extremely heavily patronized route.

20. Webster - White Plains Road (Bx41), operated by MaBSTOA, is a north-south local bus route between Wakefield, Williamsbridge, the West Bronx and the South Bronx. Within the

study area, the route basically follows the White Plains Road Line.

The route serves all the rapid transit stations of the White Plains Road Line between 241st Street and Gun Hill Road, inclusive. Because the route is under the White Plains Road El structure, it is not a feeder to the subway. The route serves Evander Childs High School, Gun Hill Houses and Misericordia Hospital. Headways are as low as five-minutes during peak periods. The patronage for the entire route, most of which is outside the study area, is heavy.

21. Westchester Avenue (Bx42), operated by MaBSTOA, is an east-west route between Westchester Square and the South Bronx. In the study area, the route provides local bus service to Westchester, Parkchester, and West Farms.

The route serves all the Pelham Line subway stations from Westchester Square to Elder Avenue. Because the route is under the Pelham Line El structure, it is not a feeder to the subway; it provides local service in the study area, access from the southern part of the study area to the South Bronx, and connection service to and from a number of other routes at Westchester Square and the Hub (149th Street and Third Avenue). The route serves several high schools and housing developments, including Parkchester, and Parkchester General Hospital. Patronage is heavy and service is very frequent (headways are as low as two minutes).

22. Orchard Beach - Co-op City (Bx52) is operated by MaBSTOA to connect Co-op City and Orchard Beach in the summer months. Service is provided at about 35-minute intervals.

23. Story Avenue (Bx54 - formerly Bx5A) is operated by MaBSTOA between Parkchester and the South Bronx. Within the study area, the route provides local bus service to the Soundview Peninsula and Parkchester.

The route serves the 177th Street Station of the Pelham Line, but provides little feeder service. The route provides service to Westchester Square Hospital and several housing developments, including Parkchester. Headways are as low as seven minutes in peak periods. There is no Sunday service.

24. Third Avenue (Bx55X), operated by MaBSTOA, is a major north-south route. It is a replacement for the Third Avenue El currently under demolition. The route connects the White Plains Road Line station at Gun Hill Road with two terminals in the South Bronx. Free transfers to the subway are provided at all terminals.

In the study area, the only stop of this route is at White Plains and Gun Hill Roads, where passengers transfer to and from the subway at no charge. In the study area, most passengers who board or alight from the route transfer from and to the subway.

Service is provided at all times. Headways are very frequent (as low as one minute), and patronage for the entire route, almost all of which is outside the study area, is fairly heavy.

25. Bronx-Jamaica (Q44), operated by NYCTA, runs between West Farms Square, Bronx and 165th Street Bus Terminal, Jamaica, Queens. Within the study area, the route provides bus service to Castle Hill, Unionport, Parkchester and West Farms operating mostly along the service roads of the Cross-Bronx Expressway.

The only rapid transit station served is the 177th Street Station of the Pelham Line, but little traffic is fed by the bus line to the subway.

The study area institutions served by this route are the Bronx River Houses and Parkchester.

Service is provided at all times at reasonable headways. Patronage for the route is quite heavy, although most of the route is outside the study area in the Borough of Queens.

26. Bronx Flushing (QBx1), operated by Queens Transit, is a major north-south local bus route between Co-op City, Bronx and Main Street and Roosevelt Avenue, Flushing, Queens.

The route serves the Pelham Bay Park Station of the Pelham Line. It is the primary access route between Co-op City and the subway. About half of the patrons using the Pelham Bay Park Station access the station using this bus line. The on-site survey indicated that in the AM peak hour the buses ran at about two-minute headways. Much of the service provided on the line is cut back at the station. There is only limited thru service to and from Queens (about every 20 minutes in the peak period).

27. Fordham Road - Mamaroneck (Route 60) is operated by Westchester Street Transportation between Fordham Road at Valentine Avenue, Bronx, and the Mamaroneck Railroad Station of the Penn Central's New Haven Line. Within the study area the route operates along Boston Road at about 30-minute headways. There is no Sunday service.

The route serves the Pelham Parkway Station of the White Plains Road Line, but provides little feeder traffic.

The route serves Cardinal Spellman High School, several housing developments and Bronx Park.

d. Other Transit

The primary transit facilities which serve residents and employees in the Northeast Bronx have been discussed previously. Below is a discussion of the four transit facilities that do not serve the area in general, but do provide specific transit services to and from the study area. They are as follows:

1. Westchester County Buses. There are seven bus lines which provide local service in Westchester County and which terminate in the study area at subway lines and provide feeder service to some subway stations. These routes are as follows:

a. Loring Avenue - 238th Street (Route 24), operated by Club Transportation Corporation, feeds traffic from the direction of downtown Yonkers to the 238th Street Station of the White Plains Road Line.

The service operates only during weekday peak periods at 40 minute headways (three round trips in the morning; four in the evening). Typical daily patronage for the route is 350 people.

b. Midland - Kimball (Route 25), operated by Club Transportation Corporation, feeds traffic from the direction of downtown Yonkers to the 238th Street Station of the White Plains Road Line.

The service operates everyday except during owl periods. During weekday peak periods, the headway is approximately 15 minutes. Typical daily patronage for the route is 4,300 people.

c. Fleetwood (Route 26), operated by Club Transportation Corporation, feeds Yonkers traffic from the direction of the Cross County Shopping Center to the 238th Street Station of the White Plains Road Line.

The service operates daily except Sundays, except during evening and owl hours. During weekday peak periods, the headway is approximately 40 minutes. Typical daily patronage for the route is about 500 people.

d. New Rochelle - 241st Street Subway (Route 42), operated by Westchester Street Transportation, feeds traffic from Mount Vernon, Pelham, and New Rochelle to the 241st Street Station of the White Plains Road Line.

The service operates daily except during owl hours. In peak periods, the headways are about ten minutes. Typical daily patronage for the route is 550 people. The on-site survey revealed that about 400 people were fed to the subway by this bus route.

e. North Pelham - 233rd Street Subway (Route 43), operated by Westchester Street Transportation, feeds traffic from Pelham and New Rochelle to the 233rd Street Station of the White Plains Road Line.

The service operates daily except Sundays from early morning to early evening. In peak periods headways are about 15 minutes. On a typical weekday, patronage was about 1,950 people. The number of bus to subway transferees is small.

f. Bronxville - Boston Road (Route 52), operated by Westchester Street Transportation, feeds traffic from Bronxville and Mount Vernon to the Dyre Avenue Station of the Dyre Avenue Line. It also stops at Boston Road at Dyre Avenue for Westchester-bound or originating passengers.

The service operates daily except Sundays from morning to early evening. In peak periods, headways are about 15 minutes. On a typical weekday, about 1,900 people use this bus route, of whom less than five percent transfer to the subway.

g. Dyre Subway - Cross County (Route 55), operated by Westchester Street Transportation, feeds traffic from the Cross County Shopping Center in Yonkers and from Mount Vernon to the Dyre Avenue Station of the Dyre Avenue Line.

The service operates daily except Sundays from morning to early evening. During peak periods, the headway is about 20 minutes. Typical weekday patronage on this route is about 2,650 people. About 125 passengers transfer between bus and subway daily.

h. Boston Road - Stamford Express (Route 61), is operated by Westchester Street Transportation between the West Bronx and Stamford, Connecticut. Within the study area, the route operates along Boston Road for Westchester- and Connecticut-bound and originating passengers. The route serves the Pelham Parkway Station of the White Plains Road Line and several housing complexes.

There are only two buses per day in each direction. The outbound trips are scheduled to leave the Bronx terminal at 7:15 AM and 3:00 PM. The inbound trips are scheduled to arrive there at 10:45 AM and 6:45 PM.

2. Penn Central Harlem Line. Although several stations on the Harlem Line are outside the northeast Bronx study area, they are within walking distance of residents who live along the western boundary of the study area north of Gun Hill Road. The Harlem Line is operated by the Penn Central for the Metropolitan Transportation Authority.

The stations with walking access from the study area are Williamsbridge (at Gun Hill Road), Woodlawn (at 233rd Street), and Wakefield (at 241st Street). Train service is provided south to Grand Central and north to such places as White Plains and Brewster.

The study-area facilities which are within walking distance (0.4 mi) of these railroad stations are Gun Hill Houses and Bronx Park (both near the Williamsbridge Station) and Misericordia Hospital (near the Woodlawn Station).

The number of trains per day at each station is as follows:

	<u>Southbound</u>	<u>Northbound</u>
Weekdays		
Wakefield	11	12
Woodlawn	14	16
Williamsbridge	14	16
Weekends		
Wakefield	no service	no service
Woodlawn	5*	6*
Williamsbridge	9*	9*

3. Employee Charter Buses. In some cases manufacturing facilities in southern Westchester provide charter buses for their employees from the ends of the subway lines in the Bronx to the plant. The following two operations were observed:

- a. Nice Pak Products, Inc. has an operation from the 241st Street Station of the White Plains Road Line to their plant in Mount Vernon; and

* plus one extra on Saturdays

- b. Sirco Corporation has an operation from the Dyre Avenue Station of the Dyre Avenue Line to their plant in Mount Vernon. The headway in the peak period is about 15 minutes, and the average load is about 35 people.

4. Racetrack Buses Service is available to area racetracks from various points in the Northeast Bronx during the racing season. These are eight routes and all are operated by New York Bus Service. In addition, there are trips to Liberty Bell and Saratoga Race Tracks.

e. Automotive Transportation

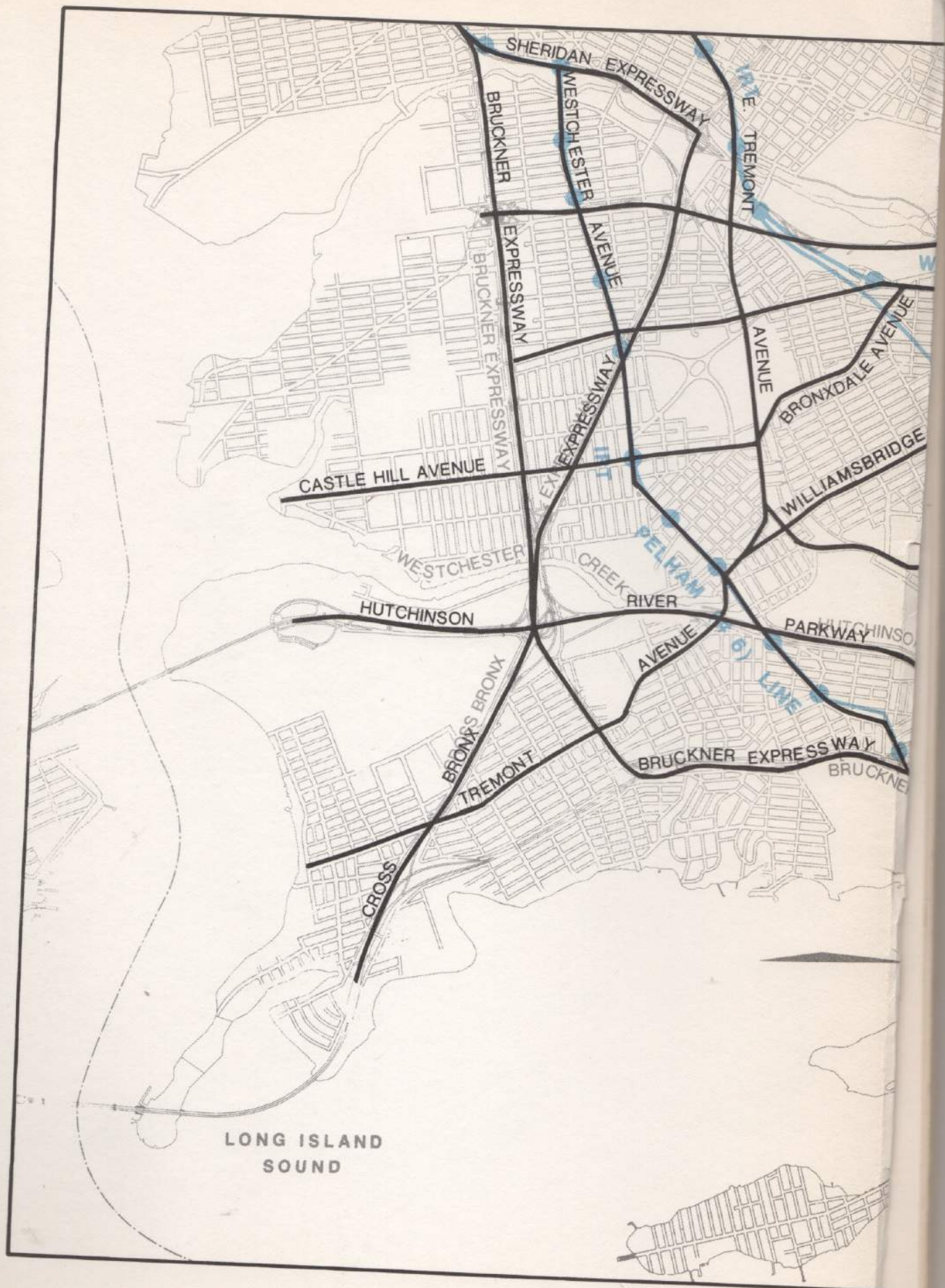
The following is a brief description of the non-transit, automotive transportation available in the study area. The presentation starts with a description of the physical facilities in the study area, in two categories: limited access highways and arterial streets (these roads are shown in Figure 11). This is followed by a brief description of the service characteristics of the various types of automotive vehicles that provide passenger transportation to and from the study area.

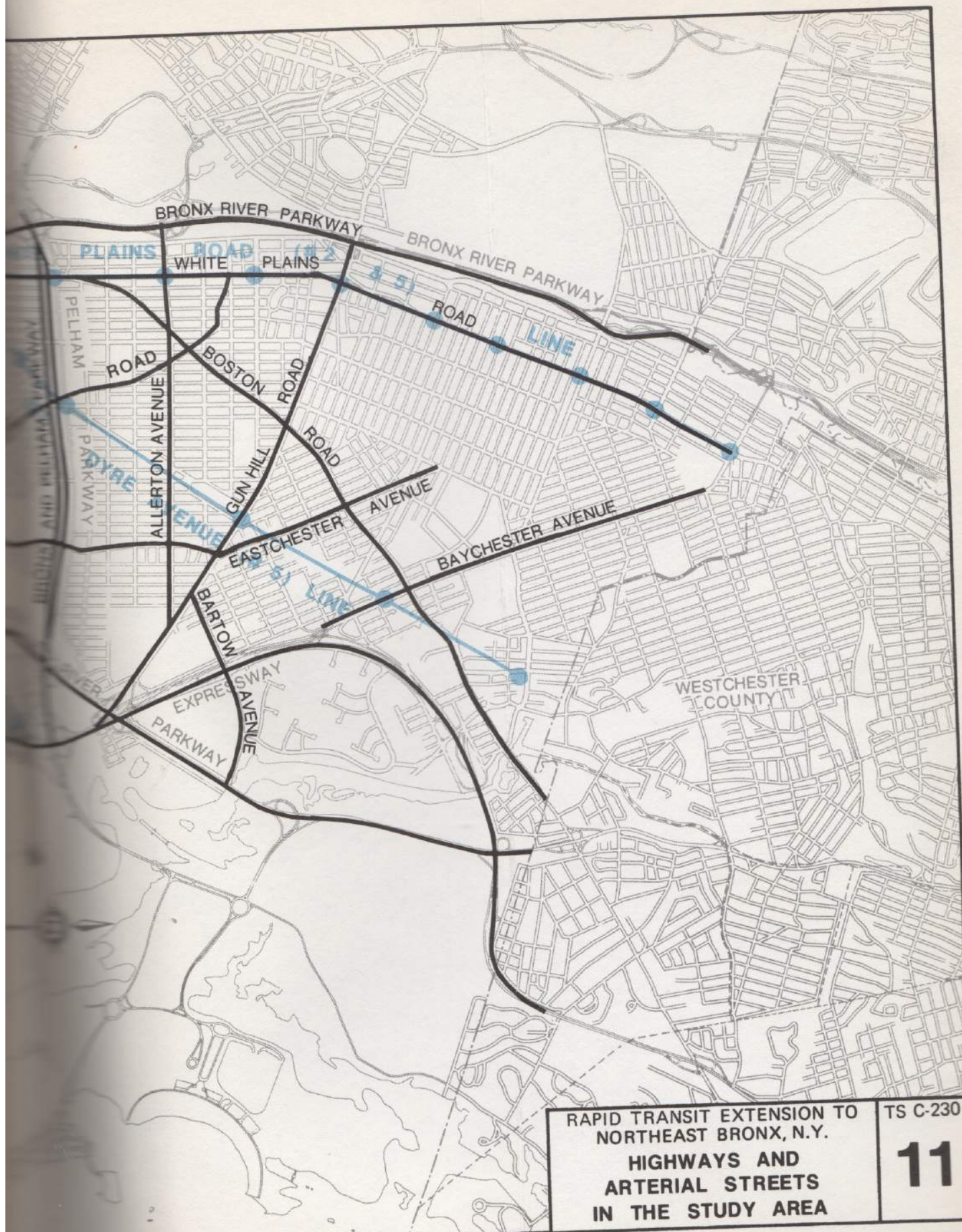
1. Limited Access Highways. There are several major limited access highways either within or bordering the Northeast Bronx study area. They are described in Figure 11. For each highway the 1974 Annual Average Daily Traffic (AADT) has been estimated to the nearest 1,000 vehicles. These AADT's were developed from data supplied by New York City Department of Traffic, Triborough Bridge and Tunnel Authority, and the New York State Department of Transportation.

The limited access highways of the Northeast Bronx are as follows:

a. Bruckner Expressway is a six-lane freeway that runs at grade along the southern edge of the study area (where it is numbered I-278) and at grade or in cut near the eastern edge of the study area (where it is numbered I-95). The road is a major connector between the Triborough Bridge (to and from Manhattan and western Queens) on the south and New England on the north. A typical 1974 AADT is about 114,000, which is an estimate for traffic volumes on the road at Elder Avenue;

b. Cross-Bronx Expressway is basically a six-lane east-west open cut freeway connecting the Bronx to New Jersey (at the George Washington Bridge) on the west and to Queens and Long Island (at the Throgs Neck Bridge) on the east. A typical 1974 AADT for this road is 114,000, which is an estimate for traffic volume near Castle Hill Avenue;





RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
HIGHWAYS AND
ARTERIAL STREETS
IN THE STUDY AREA

c. Bronx River Parkway is a north-south parkway (restricted to non-commercial vehicles) that runs along the western edge of the study area paralleling the Bronx River. It is mostly six-lanes wide. At the City limits, the AADT is estimated to be 40,000;

d. Sheridan Expressway is a short north-south, four-lane freeway serving as a connection between the Cross-Bronx Expressway and the Bruckner Expressway. It is numbered I-895. At 172nd Street the AADT is estimated to be 14,000;

e. Hutchinson River Parkway is a six-lane north-south facility connecting the Northeast Bronx with Westchester County (where it becomes a toll road) to the north and with Flushing (via the Bronx-Whitestone Bridge) to the south. The road is restricted to non-commercial vehicles. Near Pelham Parkway the AADT is estimated to be 50,000; and

f. New England Thruway is a six-lane freeway, which is part of the New York State Thruway System, and provides access to Westchester County and Connecticut from the study area. It is numbered I-95 and is a toll road north of the study area. At the Bruckner Expressway it's AADT is about 75,000.

2. Arterial Streets. In addition to the limited access highways detailed above there are many arterial streets serving the Northeast Bronx. These streets are also shown on Figure 11. Most of these streets serve not only private autos and commercial traffic, but are used by public transit buses. These routes have been categorized by direction and are shown in Table 13 along with their estimated 1974 AADT's.

Although there is an extensive street pattern in the study area, and vehicles may use many different routes to go from one place to another, traffic control facilities (e.g., traffic lights, stop signs) have been installed to encourage the use of the arterial streets and limited access highways discussed above. Other streets are primarily used for local trips and as feeder-distributors.

The private automobile is the primary vehicle which supplies passenger transportation in the study area.

The 1970 Census indicates that there are about 83,000 automobiles belonging to households in the study area. In addition, the census shows that about 38,000 automobiles are used for work trips. Therefore, almost half of the automobiles in the study area are used for work trips. The private automobile also provides passenger transportation for almost any type of trip that can be made, e.g., shopping, recreation and school trips.

TABLE 13

MAJOR ARTERIAL STREETS IN THE NORTHEAST BRONX

Facility	Est. 1974 AADT	AADT Location
<u>East-West Streets</u>		
Bronx & Pelham Parkway	26,000	Eastchester Road
Gun Hill Road	19,000	Arnow Avenue
Tremont Avenue	21,000	Castle Hill Avenue
233rd Street	20,000	White Plains Road
Allerton Avenue	8,000	Kingsland Avenue
<u>North-South Streets</u>		
White Plains Road	9,000	237th Street
Eastchester Avenue	10,000	Arnow Avenue
Baychester	17,000	Tillotson Avenue
Bronx Park East	11,000	Arnow Avenue
Castle Hill Avenue	12,000	Lafayette Avenue
<u>Diagonal Streets</u>		
Westchester Avenue	15,000	St. Peters Avenue
Boston Road	20,000	Bivona Street
Bronxdale Avenue	10,000	Neill Avenue
Bartow Avenue	15,000	Gunther Avenue
Williamsbridge Road	18,000	Pelham Parkway

In addition, taxis, licensed by the City of New York, provide "on-call" service for a meter-based fare for rides within New York City limits. Para-transit jitneys or gypsy cabs are not licensed by the city to provide "taxi-type" service, but do provide similar transportation services, usually in lower income areas.

Other types of vehicles operate over study-area highways and streets, including through over-the-road buses and trucks, and local trucks. But these vehicles do not provide passenger transportation to the study area.

f. Analysis Present Transportation System

The travel patterns found in the northeast Bronx are not typical of those found elsewhere in the United States. However, they are typical of the patterns found elsewhere in the residential parts of New York City. For example, the primary destination of work trips is Manhattan and the primary mode of work trips is subway. Table 14 exhibits this. Manhattan-destination work trips account for almost half of all work trips. The subway mode is used by almost half of all the study-area originating work trips. The use of subway for work trips is even more striking when only the Manhattan trips are examined. Table 15 shows that 80 percent of the study-area-to Manhattan work trips were made by subway in 1970. These data have changed since 1970. Estimates for the 1973 study-area-to Manhattan work trips are shown on Table 16. The table shows that the total number of trips has increased (from 66,370 to about 72,700). This is primarily because of the increase in population in the study area as a result of the full occupancy of Co-op City after 1970. The modal split, however, has changed only in the case of the subway, where the express bus mode, which did not exist in 1970, has diverted some subway riders. Nevertheless, it should be noted that the subway is the mode used for almost three-quarters of the study-area-to Manhattan work trips.

During the on-site survey taken for this study, it was found that there were only a few locations where buses fed a significant amount of patronage to the subway. Table 17 shows those locations where a bus line fed more than ten percent of subway station's patronage. The bus-subway transfer movements are truly significant at only four out of five locations listed. The movement at the 241st Street Station of the White Plains Road Line is low in volume, but significant because of the relatively low station volume.

At all stations surveyed, there were basically no facilities designed to promote a feeder bus operation. In cases where bus shelters or benches were available, they were part of another facility. For example, at Pelham Bay Park the overhead elevated structure provides some shelter; and at Westchester Square there are some benches installed as part of the park in the square.

TABLE 14
GEOGRAPHICAL DESTINATION OF STUDY AREA WORK TRIPS BY MODE

Mode	To Study Area	To Rest of Bronx	To Manhattan	To Rest of Metro Area	All Destinations	Modal Split to All Dest.
Automobile	8,308	15,270	9,702	12,620	45,900	32%
Bus	4,233	8,258	2,398	1,898	16,787	12%
Subway	1,454	7,835	53,072	5,458	67,819	47%
Other*	8,692	2,640	1,198	719	13,249	9%
Total	22,687	34,003	66,370	20,695	143,755	100%
Percent to Destination	16%	24%	46%	14%	100%	

* Rail, Taxi, Walking, et al.
Source: 1970 Census.

TABLE 15

STUDY AREA TO MANHATTAN WORK TRIPS BY MODE

Mode	Number of Trips	Modal Split
Automobile	9,702	14%
Bus	2,398	4%
Subway	53,072	80%
Other*	1,198	2%
Total	66,370	100%

* Rail, Taxis, Walking, et al
Source: 1970 Census

TABLE 16

STUDY AREA TO MANHATTAN WORK TRIPS BY MODE
ESTIMATED FOR 1973

Mode	Number of Trips	Modal Split
Automobile	10,200	14%
Bus	3,000	4%
Subway	53,400	73%
Express Bus	4,900	7%
Other*	1,200	2%
Total	72,700	100%

* Rail, Taxis, Walking, et al.

TABLE 17

SIGNIFICANT FEEDER BUS TO SUBWAY MOVEMENTS

Station	Bus Line	Origin Area	Volume (1)	Percent of Turnstile Count (2)
<u>Pelham Line</u>				
Pelham Bay Park	QBx1	Co-op City	1,360	54%
Westchester Square	Bx40	Throgs Neck Peninsula	320	30%
Castle Hill Avenue	Bx13	Castle Hill	240	18%
Sound View Avenue	Bx27	Soundview Peninsula	100	36%
<u>White Plains Road Line</u>				
241st Street	42	Yonkers	80	11%

Notes:

- (1) Surveyed AM peak hour bus to subway.
 (2) Percent of the hourly turnstile count on the survey day.

Source: On-site survey.

Bus shelters could be erected at those intermodal transfer points where traffic warrants, and where some facility is now not in place. Shelters at Westchester Square for Throgs Neck-bound passengers would be appropriate. Another intermodal facility, the park-ride lot, does not exist to any major extent at study-area subway stations (there are some cases of small, privately-owned lots). Because the area around study-area subway stations are extensively developed, the construction of park-ride (or even kiss-n-ride) facilities probably would require major condemnation and demolition work.

Table 17 also indicates that, with the exception of the station at Pelham Bay Park, the feeder bus operation is primarily to bring patrons from outside the study area to subway stations. Observations made during the on-site survey indicate that, for study area residents, walking is the primary access mode to the subway. Figure 8 shows that most of the study area is within walking distance of a subway station. This reinforces the on-site observation that the primary mode of access to the subway in the Northeast Bronx is walking.

All of the residential areas that are outside the subway's walking tributary area are well served by local buses. The largest area not within the subway's walking tributary area is in the "Penn Central Corridor", that area along the Penn Central right-of-way, which is beyond one-half mile from an existing subway station. It is estimated that about 62,000 people live in the area, of which about 35,000 live in Co-op City. Table 18 shows work trip destinations, by mode, for corridor residents. About one-third of the residents (37%) use subway as the primary mode to get to work. This is a departure from the statistics of the entire study area (see Table 14) which shows that almost half of all trips are by subway. This is not unexpected because subways do not serve the area directly. The bus mode, which serves the area directly, is significantly greater in the corridor (23%) than in the study area in general (12%). The geographical destination split in the corridor shows that 80% of the residents work in Manhattan and the Bronx, whereas 86% of the study area work in Manhattan and the Bronx. This shows that Penn Central corridor residents are somewhat in less need of rapid transit facilities to Manhattan and to the southern Bronx than are the residents of the study area in general.

The levels of patronage at study-area subway stations have generally been decreasing. Between FY 1963 and 1973 the decline has averaged 15 percent. This decline follows the general pattern for all New York City subway stations. The notable exceptions to the pattern are the stations in the extreme northeast corner of the study area, near Co-op City. At Pelham Bay Park (Pelham Line,) Dyre Avenue (Dyre Avenue Line) and Baychester Avenue (Dyre Avenue Line) the average of the increase in traffic has been 45 percent over the aforementioned ten year period. This growth is primarily due to Co-op City.

TABLE 18

GEOGRAPHICAL DESTINATION OF PENN CENTRAL CORRIDOR WORK TRIPS BY MODE

Mode	To Study Area	To Rest of Bronx	To Manhattan	To Rest of Metro Area	All Destinations	Modal Split to All Dest.
Automobile	1,821	2,054	1,297	2,530	7,702	35%
Bus	546	2,336	1,009	1,022	4,913	23%
Subway	74	582	6,659	665	7,980	37%
Other*	579	369	114	59	1,121	5%
Total	3,020	5,341	9,079	4,276	21,716	100%
Percent to Destination	14%	25%	42%	20%	100%	

* Rail, Taxi, Walking, et al.

Source: 1970 Census updated to 1973

The most heavily used subway line in the study area is the Pelham Line. The busiest stations are, in descending order, 177th Street, Pelham Bay Park and Soundview Avenue Stations, all on the Pelham Line.

All service in the study area is provided by the IRT. In the peak hours, trains are operated in ten-car consists. There are 44 seats in each car, and about 100 more passengers can stand in each car, thus giving each ten-car train a practical capacity of 1,400 passengers.

Once trains leave the study area, they must serve, first, the southern Bronx, and then upper Manhattan. The Transit Authority takes semi-annual cordon counts, which include study-area passengers, at the Harlem River and entering midtown Manhattan.

The fall 1973 Harlem River cordon counts were used in calibrating the assignment model as previously described. Table 19 shows the Harlem River cordon counts for 1973 during a typical AM peak hour. The model-predicted counts are all within two percent of the actual counts. This is quite satisfactory. The capacity data shows that the Lexington Avenue Express (at 83%) is approaching practical capacity at the Harlem River cordon, while the other two lines are operating at about half capacity. These results are not surprising. The express has only two stops (125th Street and 86th Street) before entering midtown Manhattan, where significant off-loading begins in the AM peak hour. The other two lines have more stops before entering midtown Manhattan (the Lexington Local has eight stops; the Seventh Avenue Express has six stops). Therefore these lines must have the capacity to accommodate the passengers at these "additional" stops.

The point of peak loading on study-area originating subway trains is entering midtown Manhattan during a typical AM peak hour. Table 20 shows that, as in the previous table, the difference between the actual and model-predicted cordon counts is satisfactorily small (here less than one percent). The data indicates that the peak hour accounts for about one-quarter of the daily traffic across this cordon. More importantly, it shows that the Lexington Avenue Express is operating at about its practical capacity with the other lines operating at a lesser level. Therefore, the new Second Avenue Line should, at least, provide relief to the Lexington Avenue Express.

The data generated in this analysis is used as the basis for the analysis of the three proposals discussed in the next section and the comparison among the proposals in Chapter VII.

TABLE 19

HARLEM RIVER CORDON COUNTS FOR 1973
DURING A TYPICAL AM PEAK HOUR

	Lex. Exp.	Lex. Lcl.	7th Ave. Exp.
Actual Cordon Count (1)	34,690	23,720	10,780
Model Predicted Cordon Count	34,800	23,500	10,900
Percent of Daily Volume (2)	30%	31%	21%
Percent of Practical Capacity (2)	83% (3)	56% (3)	51% (4)

Notes:

- (1) NYCTA October 1973 Cordon Counts
- (2) Based on Actual Cordon Count
- (3) Assuming 30 ten-car trains per hour,
1400 passengers per train
- (4) Assuming 15 ten-car trains per hour,
1400 passengers per train

TABLE 20

ENTERING MIDTOWN MANHATTAN CORDON COUNT FOR 1973
DURING A TYPICAL AM PEAK HOUR

	Lex. Exp.	Lex. Lcl.	7th Ave. Exp.
Actual Cordon Count (1)	41,230	26,120	26,270
Model Predicted Cordon Count	41,400	25,900	26,400
Percent of Daily Volume (2)	28%	26%	27%
Percent of Practical Capacity (2) (3)	98%	62%	65%

Notes:

- (1) NYCTA October 1973 Cordon Counts
- (2) Based on Actual Cordon Counts
- (3) Assuming 30 ten-car trains per hour,
1400 passengers per train.

Transportation Analysis of Alternate Proposals

a. Overview

In this section, the alternative proposal for extending the Second Avenue Line into the Northeast Bronx are described along with the planned system operation if each of the proposals was adopted. This is followed by a description of the transportation analysis which was carried out, and the results of that analysis. Tables 21 and 22 summarize the planned operation on Northeast Bronx subway lines under each proposal.

b. Description of Proposals

1. Pelham-Dyre Proposal. Under this proposal, half of the Second Avenue trains would be routed to the existing Pelham Line north of Hunts Point Avenue, and the other half to the existing Dyre Avenue Line. The layout of the study-area transit network, with this proposal implemented is shown in Figure 41. All facilities on both the Pelham Line north and east of Hunts Point Avenue, and the Dyre Avenue Line would be renovated to accommodate R44-type equipment. The current IRT Lexington Local (#6 Train) service would terminate at the existing Hunts Point Avenue Station. It is planned to operate the #6 Train at a two minute headway. Service on the Pelham Line north and east of Hunts Point Avenue would be provided by the new Y Train (Bronx-Second Avenue). The current IRT Dyre Avenue Service (#5 Train) would be cut back to terminate at E. 180th Street. The Dyre Avenue Line would be served by the N Train (Dyre-Second Avenue-Broadway Express-Sea Beach). It is planned to operate the Y Train and the N Train at four-minute headways each for a combined headway of two minutes on the truck portion of the Second Avenue Line.

This proposal would have Second Avenue trains serve existing stations on the Dyre Avenue Line and on the Pelham Line from the Whitlock Avenue Station north to the Pelham Bay Park Station. A new station at Hunts Point Avenue would be built for the Y Train east of the existing Hunts Point Avenue Station. A new station would be built at 174th Street to be served by the N Train, and the existing station at 180th Street would be modified to enable passengers to transfer between the IRT (#2 and 5 Trains) and the N Train.

2. Penn Central-Dyre Avenue. Under this proposal, half of the Second Avenue trains would be routed to the existing Dyre Avenue Line, and the other half to a new subway branch line along the Penn Central right-of-way. The configuration of the transit network with this proposal implemented is shown in Figure 42. This would require reconstruction of the Dyre Avenue Line and

TABLE 21

PLANNED OPERATIONS ON STUDY-AREA SUBWAY LINES
IN AM PEAK HOUR UNDER EACH PROPOSAL

	Pelham-Dyre Proposal		Penn Central-Dyre Proposal		White Plains Road-Dyre Proposal	
	Train	Headway (Minutes)	Train	Headway (Minutes)	Train	Headway (Minutes)
Pelham Line	Y Second Ave. Line	4	6 Pelham EXP & LCL	2 (1)	6 Pelham EXP & LCL	2 (1)
Penn Central Line	-	-	Y Second Ave. Line	4	-	-
Dyre Ave. Line	N Second Ave.-Bwy	4	N Second Ave.-Bwy	4	N Second Ave.-Bwy	4
White Plains Road Line	2 Seventh Ave. EXP (2) 6	6	2 Seventh Ave. EXP (2) 6	6	Y Second Ave. Line	4

- NOTES: (1) Local and Express combined headway.
 (2) Also Lexington Ave. thru Express at eight minute headways north of East 180th Street and four minute headways on both Seventh Avenue and Lexington Avenue Express lines south of East 180th Street.

TABLE 22
TERMINALS AND ROUTES OF A.M. PEAK HOUR TRAINS SERVING
NORTHEAST BRONX SUBWAY LINES UNDER EACH PROPOSAL

Train Designation	Headway (minutes)	North Terminal			White Plains Road-Dyre Proposal	Midtown Manhattan Subway Route	South Terminal
		Pelham-Dyre Proposal	Penn Central-Dyre Proposal	Dyre Central-Dyre Proposal			
#2	4	241st Street	241st Street	180th Street	180th Street	Seventh Ave. Exp.	New Lots Avenue, Brooklyn
#5	4	180th Street (1)	180th Street (1)	180th Street	180th Street	Lexington Ave. Exp.	Utica Avenue, Brooklyn
#6 Loc.	4 (2)	Hunts Point Ave.	177th Street	177th Street	177th Street	Lexington Ave. Loc.	Brooklyn Bridge, Manhattan
#6 Exp.	4	—	Pelham Bay Park (3)	Pelham Bay Park (3)	Pelham Bay Park (3)	Lexington Ave. Loc.	Brooklyn Bridge, Manhattan
N	4	Dyre Avenue	Dyre Avenue	Dyre Avenue	Dyre Avenue	Broadway Exp.	Coney Island, Brooklyn (4)
Y	4	Pelham Bay Park	Co-op City	241st Street	241st Street	Second Avenue	Whitehall Street, Manhattan

Notes:

- (1) Also thru Express - from 241st Street using express track between 180th Street and 149th Street - Third Avenue.
- (2) For Pelham-Dyre Proposal: 2 minute headway^a
- (3) Uses express track between 177th Street and 125th Street, Manhattan.
- (4) Uses Sea Beach tracks in Brooklyn.

stations to accommodate R44-type equipment, and construction of an entirely new subway line on the existing Penn Central right-of-way. This right-of-way is generally in cut or on embankment. The Penn Central tracks are used daily by 15 passenger trains in each direction and two freight trains in each direction.

Service on each branch of the Second Avenue Line is planned to be four minutes, with a combined headway of two minutes on the trunk line portion of the Second Avenue Line. The existing IRT Dyre Avenue Service (#5 Train) would be cut back to terminate at 180th Street. The Dyre Avenue Line would be served by the N Train (Dyre-Second Avenue-Broadway Express-Sea Beach), and the Penn Central Line by the Y Train (Bronx-Second Avenue).

Where the Penn Central right-of-way crosses Hunts Point Avenue, a new subway station would be built in the cut which would be served by both the N and Y Trains. The new station would be east of the existing Hunts Point Avenue Station of the Pelham Line. The two stations would be connected by a corridor to enable passengers to transfer between them.

The stations on the Dyre Branch of the Second Avenue Line would be all of the existing stations on the Dyre Avenue Line. The station at 180th Street would be rebuilt to enable passengers to transfer between the IRT (#2 and 5 Trains) and the N Trains.

The stations on the Penn Central Branch would be entirely new. They would be as follows:

a. 174th Street near Bronx River Avenue. This station, which would be served only by the Y Train, provides transit service to Bronx River Houses, which now is beyond walking distance to a subway station. The Bx36 bus route, which operates across 174th Street, could serve the station;

b. White Plains Road near Tremont Avenue. This station would provide transit service to the northwest portion of Parkchester, which now is on the fringe of walking distance from the 177th Street Station of the Pelham Line. Routes Bx13 (on Unionport Road) and Bx40 (on Tremont Avenue) would serve the station;

c. Bronxdale Avenue near Tremont Avenue. This station would provide access to the northeast section of Parkchester and the southern part of the Morris Park neighborhood, an area which is beyond reasonable walking distance to a subway station. The Bx40 (on Tremont Avenue) runs near the site of the proposed station. The existing terminal of the Bx54 at Purdy Street-Parkchester could be moved several blocks north to serve the station;

d. Eastchester Road near Sackett Avenue. This station would provide transit access to Yeshiva University-Einstein College of Medicine, its hospital and residences. The Bx9 running along Eastchester Road, and the Bx26 terminating at Eastchester Road and Sackett Avenue, would serve the station;

e. Pelham Parkway near Bassett Avenue. The Bx5 and Bx12 on Pelham Parkway would serve this station. Although the station is near Bronx Municipal Hospital Center (Jacobi Hospital) and Bronx State Hospital, the entrances to these institutions are not within walking distances of the station site; and

f. Co-op City, at the extreme south end of the housing development, would be within walking distance of the buildings in the southern section (about 15,000 residents). The Bx15, 17 and 52, and the QBx1, which operate throughout Co-op City, terminate at a point near the site of this proposed station. These lines could provide feeder service from the northern sections of Co-op City (about 40,500 residents).

3. White Plains-Dyre Proposal. Under this proposal, the current IRT Lines north of 180th Street would become the branches of the Second Avenue Line. The rapid transit network, with this proposal implemented, is shown in Figure 40. N Trains, at four-minute headways, would serve the Dyre Branch; Y Trains, also at four-minute headways, would serve the White Plains Branch. South of 180th Street, the Second Avenue Line would be served by both N and Y Trains at a combined headway of two minutes. IRT #1 and 5 Trains would be cut back to terminate at 180th Street. Their combined headway would be two minutes.

The existing facilities on both branches would have to be reconstructed to accommodate R44-type equipment. At Hunts Point Avenue Station a new station would be built for Second Avenue trains in the Penn Central right-of-way cut. This new station would have its center platform configuration parallel to, and east of, the existing Hunts Point Avenue Station of the Pelham Line. A passageway, several hundred feet long, connecting the two stations, would allow passengers to make free transfers between the Lexington Avenue Local (#6 Train) and the Second Avenue Line (N and Y Trains). At 174th Street a new station would be built just west of Bronx River Avenue. It is planned that both the N and Y Trains would serve this station. At 180th Street, the existing station would become a terminal for the IRT (#2 and 5 Trains) and a station for the Second Avenue Line would be constructed at the abandoned New York, Westchester and Boston Railroad Station. The Second Avenue Line platforms would be parallel to, and east of, the existing station platforms. A passageway connecting the platforms of the two stations would allow passengers to make free transfers between the IRT #2 and 5 Trains on the one hand and the Second Avenue Line (N and Y Trains) on the other hand.

c. Transportation Analysis

The analysis of passenger flow for each of the three proposals was carried out as follows: Growth factors, based on 1990 land development data, were applied to the trip table for 1973, (whose development was described earlier). This resulted in a trip table for 1990. This trip table was then "loaded" onto four networks: the current network (to produce a 1990 pro forma case) and the network as configured for each of the three proposals. The first case produced passenger flow data for the condition that would exist if the new routes program were not carried out. The latter three cases produced parallel data for the condition that would exist if each of the proposals were constructed.

The estimated patronage on study-area subway lines is shown on Table 23. In general, under three proposals the study-area subway lines will have patronage greater than the current patronage. The patronage for the Pelham-Dyre and White Plains Road-Dyre Proposals are the same. Under the Penn Central-Dyre Proposal, patronage is diverted to the new Penn Central Line facilities. There is significant diversion from the Pelham Line, and there is minor diversion from the other lines.

Approximate run times from major stations on study-area subway lines to midtown Manhattan are shown on Table 24. From the Pelham Line stations to midtown, only the Pelham-Dyre proposals offers run time savings. Only the Penn Central-Dyre Proposal offers run time savings from the Co-op City area. All proposals offer run time savings from Dyre Avenue. Only the White Plains Road-Dyre Proposal offers run time savings from 241st Street. The significance of these run time savings are discussed later, in Chapter VII.

The critical points of passenger flows, as previously mentioned, are at the Harlem River and entering midtown Manhattan. Table 25 shows projected cordon counts at the Harlem River for each of the three proposals. Table 26 shows similar data for the midtown Manhattan cordon. The midtown Manhattan cordon for the Second Avenue Line was chosen to be just north of 72nd Street. The reason for this choice is as follows: the 72nd Street Station is the north terminal of the QB. In order to exclude the capacity of the QB from the load factor calculations, and thus not bias the results, the cordon line has to be north of the station.

It was assumed that the passenger loadings in northern Manhattan would basically remain stable between 1973 and 1990. This is based on the fact that the area is fully developed and new construction would result only in replacement housing. The only exception to this is the Ruppert, Yorkville and Knickerbocker Towers complex which is replacing the Ruppert Brewery. This site

TABLE 23

ESTIMATED PATRONAGE ON STUDY AREA SUBWAY LINES IN
AM PEAK HOUR FROM BRONX TO OTHER BOROUGH

	1973 Model Predicted	1990		
		Pelham- Dyre	Penn Central- Dyre	White Plains Road- Dyre
PELHAM LINE	17,100	18,700	13,200	18,700
PENN CENTRAL LINE	-	-	7,600	-
DYRE AVE. LINE	4,200	5,700	4,900	5,700
WHITE PLAINS RD. LINE	10,600	10,700	10,200	10,700
TOTAL	31,900	35,100	35,900	35,100

APPROXIMATE RAIL RAPID TRANSIT RUN TIMES FROM STUDY AREA
TO 42ND STREET, MANHATTAN IN THE A.M. PEAK HOUR

Notes: (1) off-peak

TABLE 25

HARLEM RIVER CORDON COUNTS
SOUTHBOUND IN AM PEAK HOUR

	1973		1990 PROPOSALS			
	Actual	Model-Predicted	Pro Forma 1973 (1)	Pelham-Dyre	Penn Central-Dyre	White Plains Rd.-Dyre
<u>CORDON COUNTS</u>						
Second Avenue Line	-	-	-	24,300	17,600	17,800
Lexington Avenue Local	23,700	23,500	25,400	11,000	19,000	23,200
Lexington Avenue Express	34,700	34,800	36,200	30,100	29,000	25,200
Seventh Avenue Express	10,800	10,900	11,700	7,900	7,700	7,100
<u>LOAD FACTORS (% of Capacity)</u>						
Second Avenue Line (2)	-	-	-	48%	35%	35%
Lexington Avenue Local (3)	56%	56%	60%	26%	45%	55%
Lexington Avenue Express (3)	83%	83%	86%	71%	69%	60%
Seventh Avenue Express (4)	51%	52%	56%	37%	36%	33%

NOTES:

- (1) Assume 1973 headways as noted below.
 (2) Assuming two minute headways, 1680 passengers per train.
 (3) Assuming two minute headways, 1400 passengers per train.
 (4) Assuming four minute headways, 1400 passengers per train.

TABLE 26

ENTERING MIDTOWN MANHATTAN CORDON COUNTS
SOUTHBOUND IN AM PEAK HOUR

	1973		Pro Forma 1973 (1)	1990 PROPOSALS		
	Actual	Model- Predicted		Pelham- Dyre	Penn Central- Dyre	White Plains Rd.- Dyre
<u>CORDON COUNTS</u>						
Second Avenue Line	-	-	-	29,700	23,100	23,300
Lexington Avenue Local	26,100	25,900	28,000	12,100	20,000	24,400
Lexington Avenue Express	41,200	41,300	42,900	33,000	31,900	28,100
Seventh Avenue Express	26,300	26,400	27,300	23,400	23,200	22,500
<u>LOAD FACTORS (% of capacity)</u>						
Second Avenue Line (2)	-	-	-	59%	46%	46%
Lexington Avenue Local (3)	62%	62%	67%	28%	47%	58%
Lexington Avenue Express (3)	98%	98%	102%	78%	75%	66%
Seventh Avenue Express (3)	63%	63%	65%	55%	55%	53%

NOTES:

- (1) Assume 1973 headways as noted below.
 (2) Assuming two minute headways, 1680 passengers per train.
 (3) Assuming two minute headways, 1400 passengers per train.

is between Second and Third Avenues in the low 90's. In addition, it was assumed that patronage on the upper east side of Manhattan was split between the Lexington Avenue Line and the Second Avenue Line on the basis of the population distribution in the area.

At the Harlem River Cordon, the 1990 Pro Forma 1973 (the do-nothing case) shows that the Lexington Avenue Express is most crowded, and probably should be relieved. The Pelham-Dyre Proposal provides some relief because the load on the Lexington Avenue Express is reduced by about 6,000 people (16%). The load factor on the Penn Central-Dyre Proposal is about the same as the Pelham-Dyre condition. Only the White Plains Road-Dyre Avenue Proposal relieves the Lexington Avenue Express to a significant degree.

At the Entering Midtown Manhattan Cordon, (Table 26), the pro forma case indicates that if the Second Avenue Line were not built the Lexington Avenue Express loadings at the peak load point would exceed practical capacity. (In the current case they are just below practical capacity). All proposals relieve the Lexington Avenue Express, but the White Plains Road-Dyre Proposal relieves the Lexington Avenue Express the most. The Pelham-Dyre Proposal provides relief to return the load factor to the 1973 condition. The Penn Central-Dyre Proposal provides only slightly more relief.

Further discussion of load factors at cordons are given in Chapter VII, Evaluation and Analysis of Alternate Proposals.

CHAPTER III

III. TRANSIT CORRIDORS CONSIDERED

INTRODUCTION

The purpose of this chapter is to identify and evaluate the transit corridors that are most likely to be used by the public in the future. The study is based on a survey of the transit system and a review of the literature on transit corridors.

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TRANSIT CORRIDORS CONSIDERED

III. TRANSIT CORRIDORS CONSIDERED

Introduction

Early during the preliminary phases of this study and after careful consideration of *all possible locations*, the following four corridors were selected as the only *feasible rights-of-way* for extending the new Second Avenue Line into the Northeast Bronx.

1. The existing NYCTA Pelham Bay Line elevated structure from approximately the intersection of Hunts Point Avenue and E. 163rd Street to its terminal at Westchester and Burr Avenues. Reference is made to Figure 12.
2. The Penn-Central Railroad right-of-way (formerly the New York, New Haven and Hartford Railroad) from the southerly boundry of the study area north to the vicinity of the south site of Co-op City. Reference is made to Figure 13.
3. The existing NYCTA Dyre Avenue Line right-of-way from approximately the intersection of E. 174th Street and the Penn-Central Railroad to E. 180th Street (non-operating portion) and from E. 180th Street to Dyre Avenue (operating portion). Reference is made to Figure 14.
4. The existing NYCTA White Plains Road Line elevated structure from approximately the intersection of E. 180th Street and Bronx River Parkway to its terminal at E. 241st Street and White Plains Road. Reference is made to Figure 15.

Early in 1973 the studies completed by consulting engineers Sverdrup and Parcel clearly indicated that the southern portion of the Second Avenue Line in the Bronx should follow an alignment through the Penn-Central Harlem River Yards and then proceed north along the westerly part of the former New York, New Haven and Hartford Railroad ROW to the southerly boundry of the study area in the vicinity of Hunts Point Avenue.

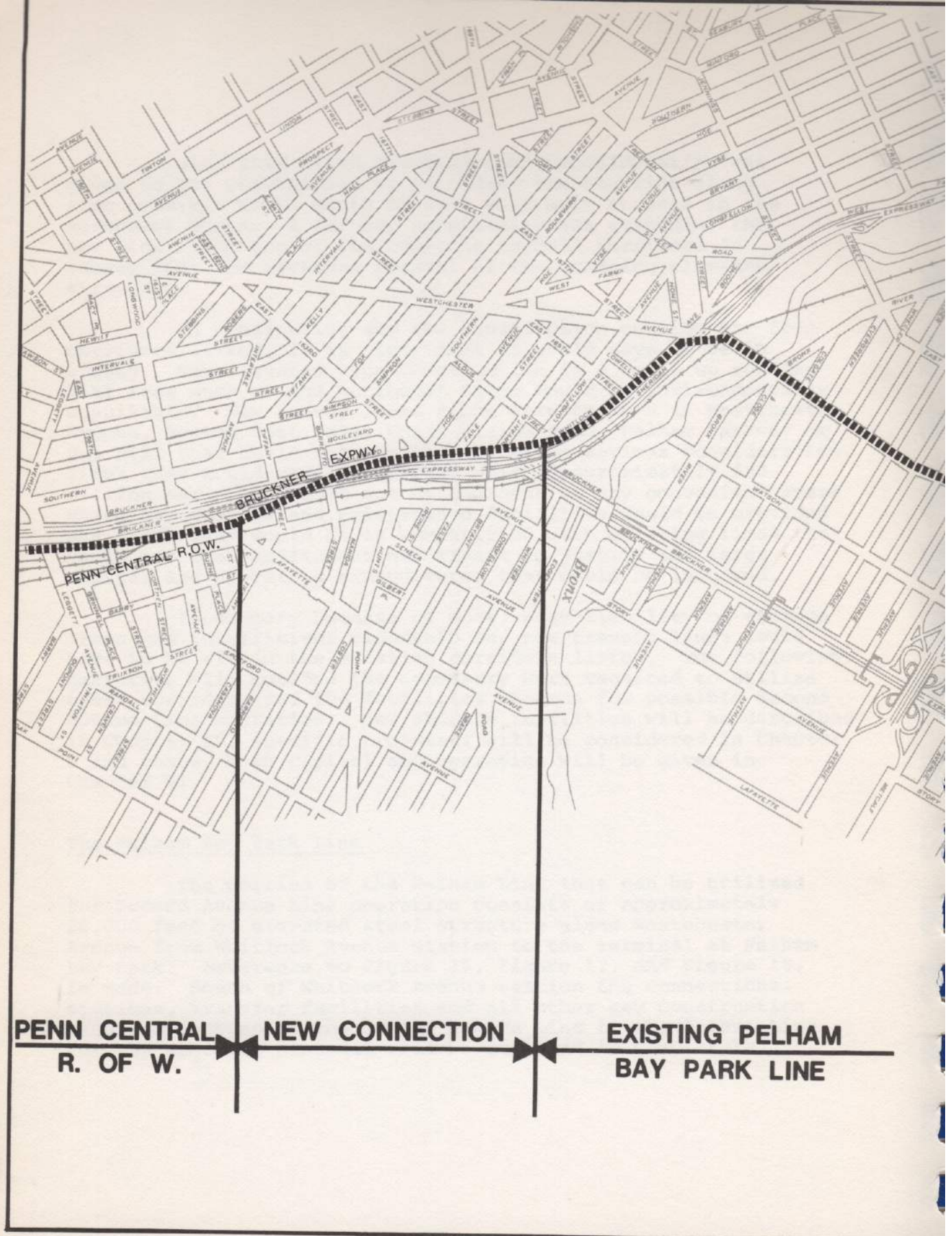
With this fixed starting point consideration was given to the possibility of extending the new line along some possible north south or east west main streets in the Northeast Bronx. A further possibility was extending the new line along one of the existing transit corridors in subway with the eventual removal of the existing elevated structure.

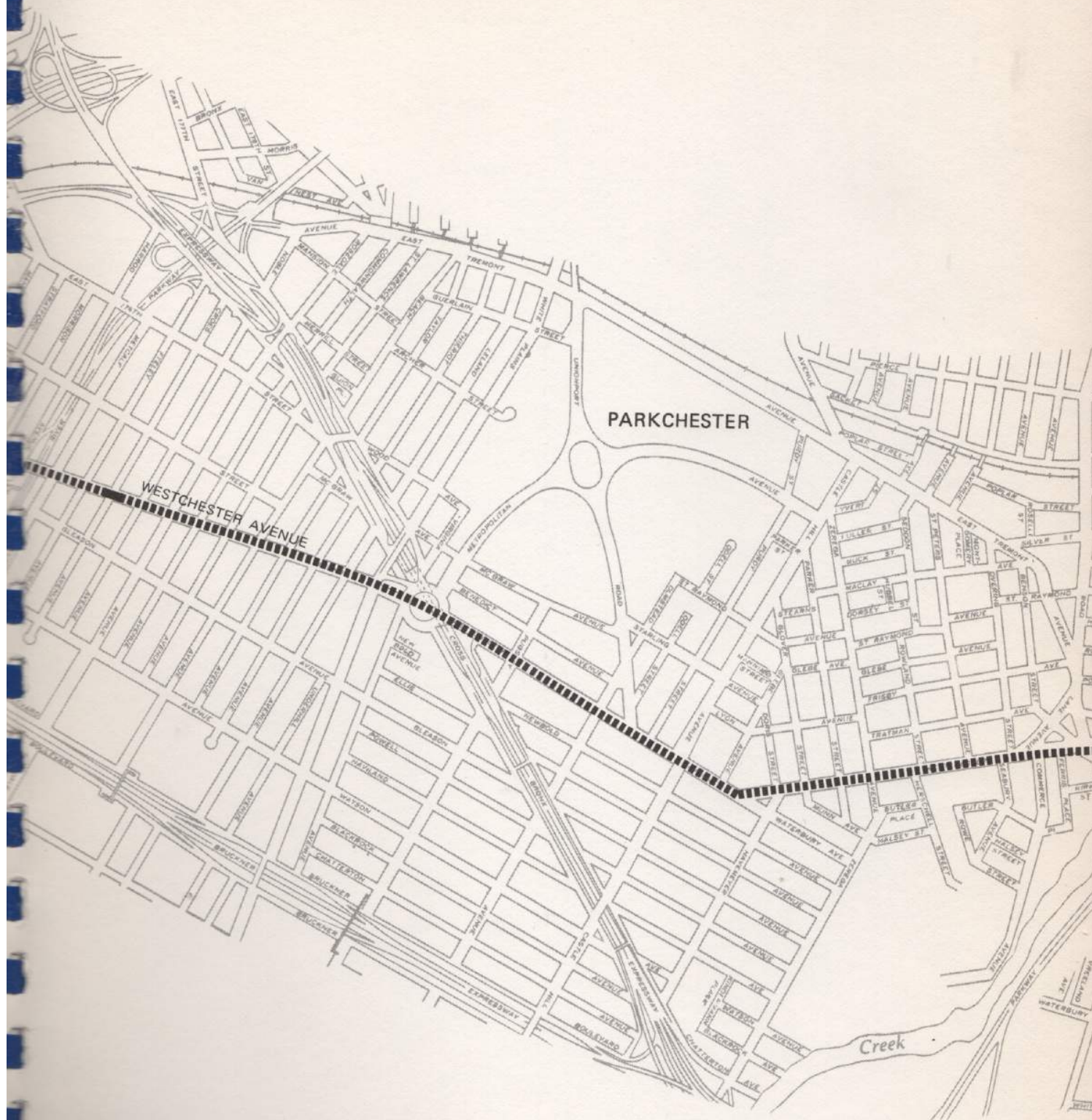
In considering any new construction outside the four corridors listed, it is clear that it would have to be in subway. New elevated type construction in a built up residential area such as the northeast Bronx would be environmentally unsuitable. New subway lines along streets such as Westchester Avenue, Boston Post Road, White Plains Road, Pelham Parkway or Gun Hill Road could not possibly be given serious consideration. First they would cost at present prices approximately \$80 million per mile, would not be adjacent to any convenient areas where car storage and maintenance facilities could be provided and since they would be in competition with existing lines they could not draw sufficient new riders to justify the large capital and operating expenditures that would be incurred.

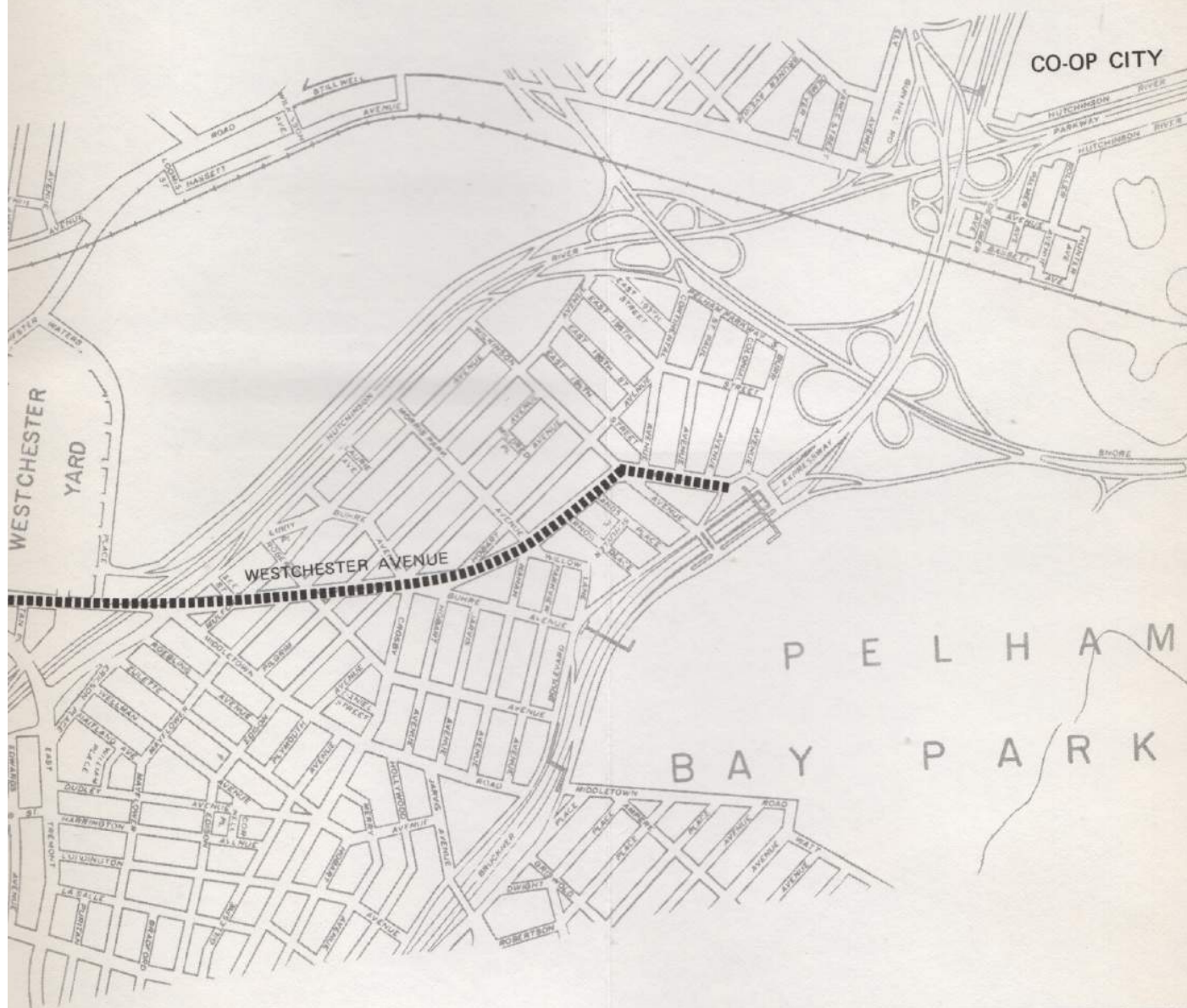
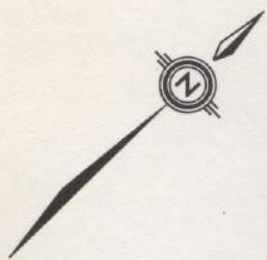
In summary because of cost, unavailability of storage areas and insufficient ridership any new transit lines would have to be within the existing corridors listed. The following narrative will outline the necessary work required to utilize these corridors and the facilities thereon for possible Second Avenue Line operation. New storage facilities will be described in Chapter IV, specific proposals will be considered in Chapter V and costs, both capital and operating will be given in Chapter VI.

The Pelham Bay Park Line

The portion of the Pelham Line that can be utilized for Second Avenue Line operation consists of approximately 20,000 feet of elevated steel structure along Westchester Avenue from Whitlock Avenue station to the terminal at Pelham Bay Park. Reference to Figure 16, Figure 17, and Figure 18, is made. South of Whitlock Avenue station the connections, stations, transfer facilities and all other new construction required to connect the Second Avenue Line to the Pelham Line for any specific proposal will be outlined in Chapter IV.





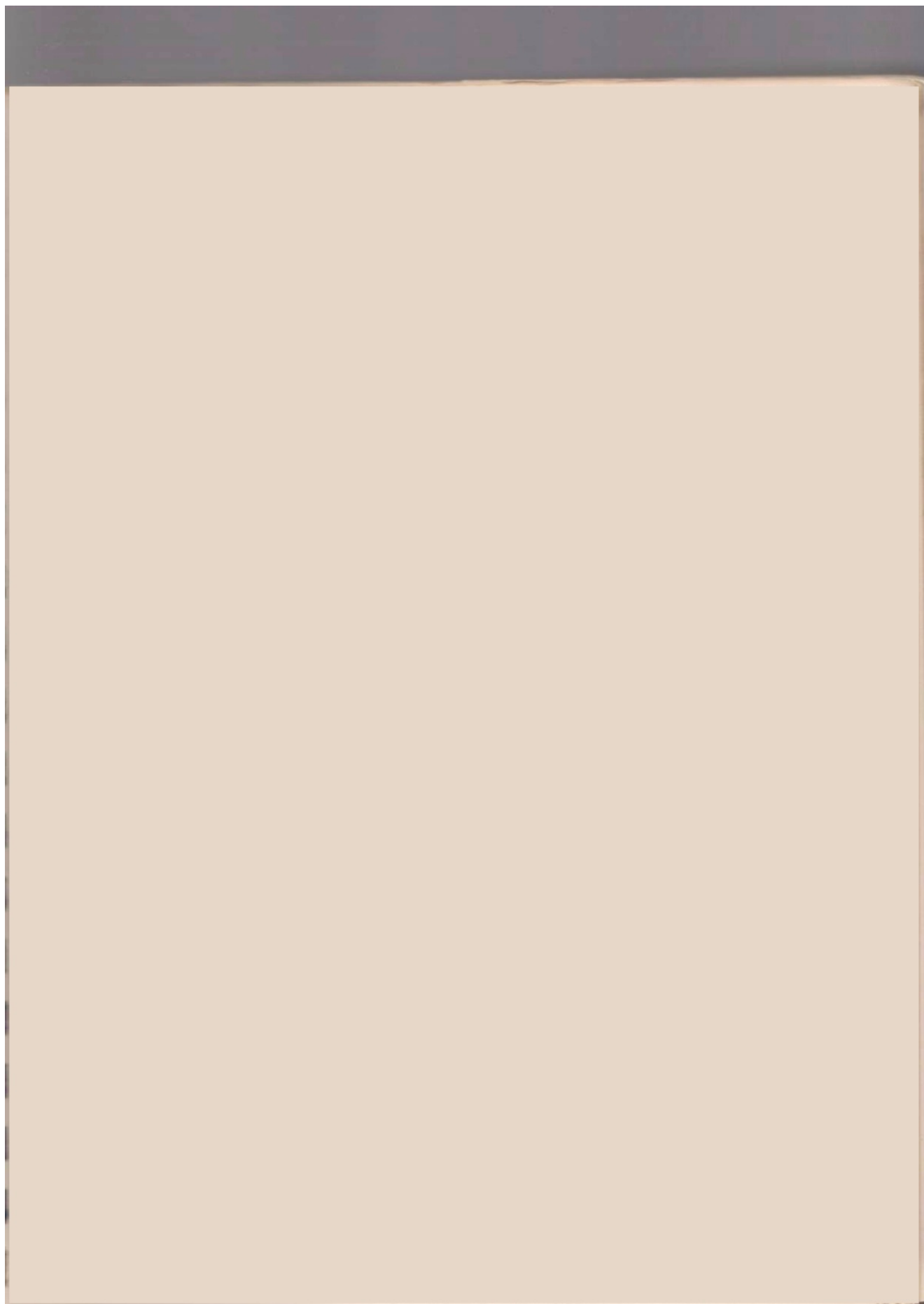


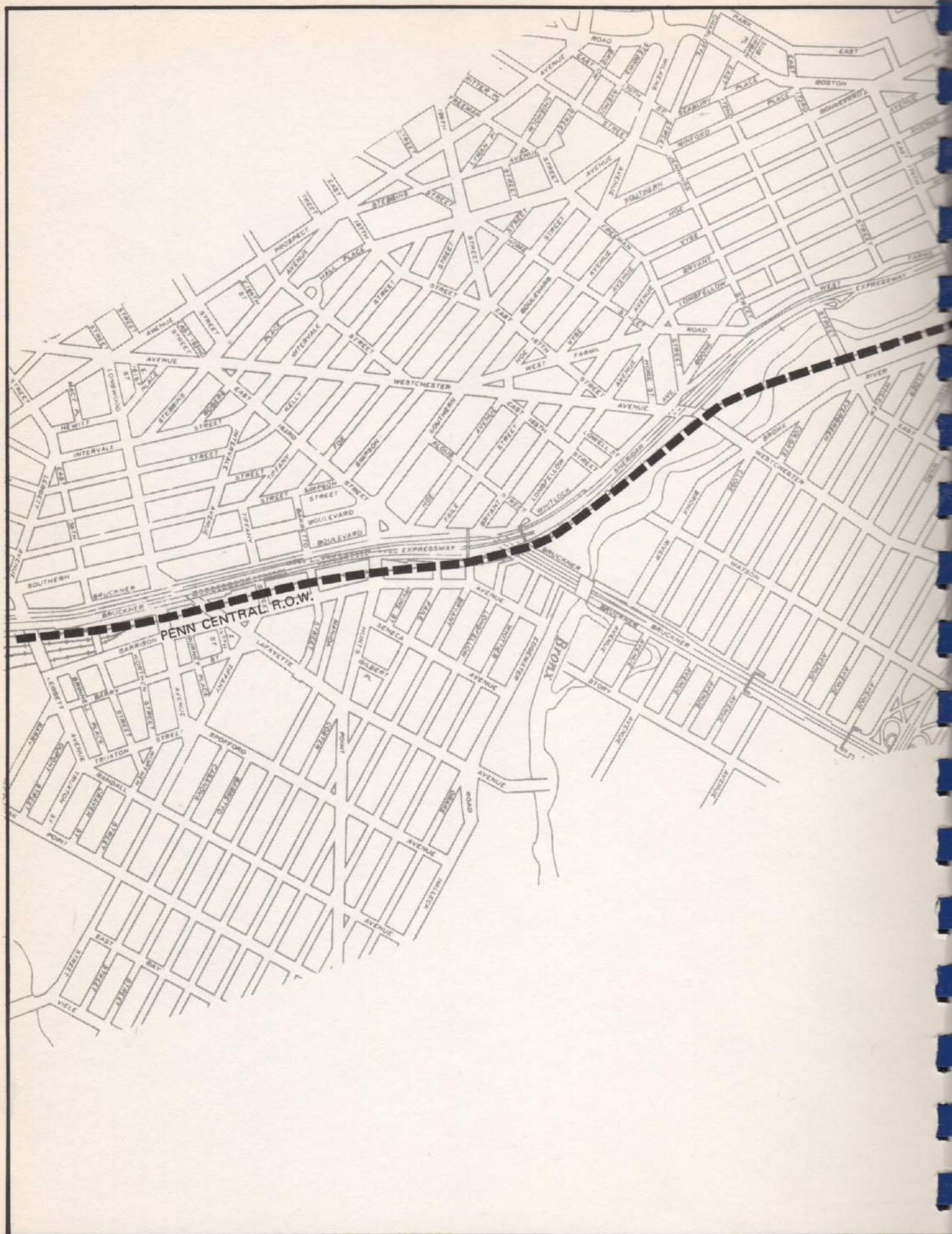
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NORTHEAST BRONX, N.Y.

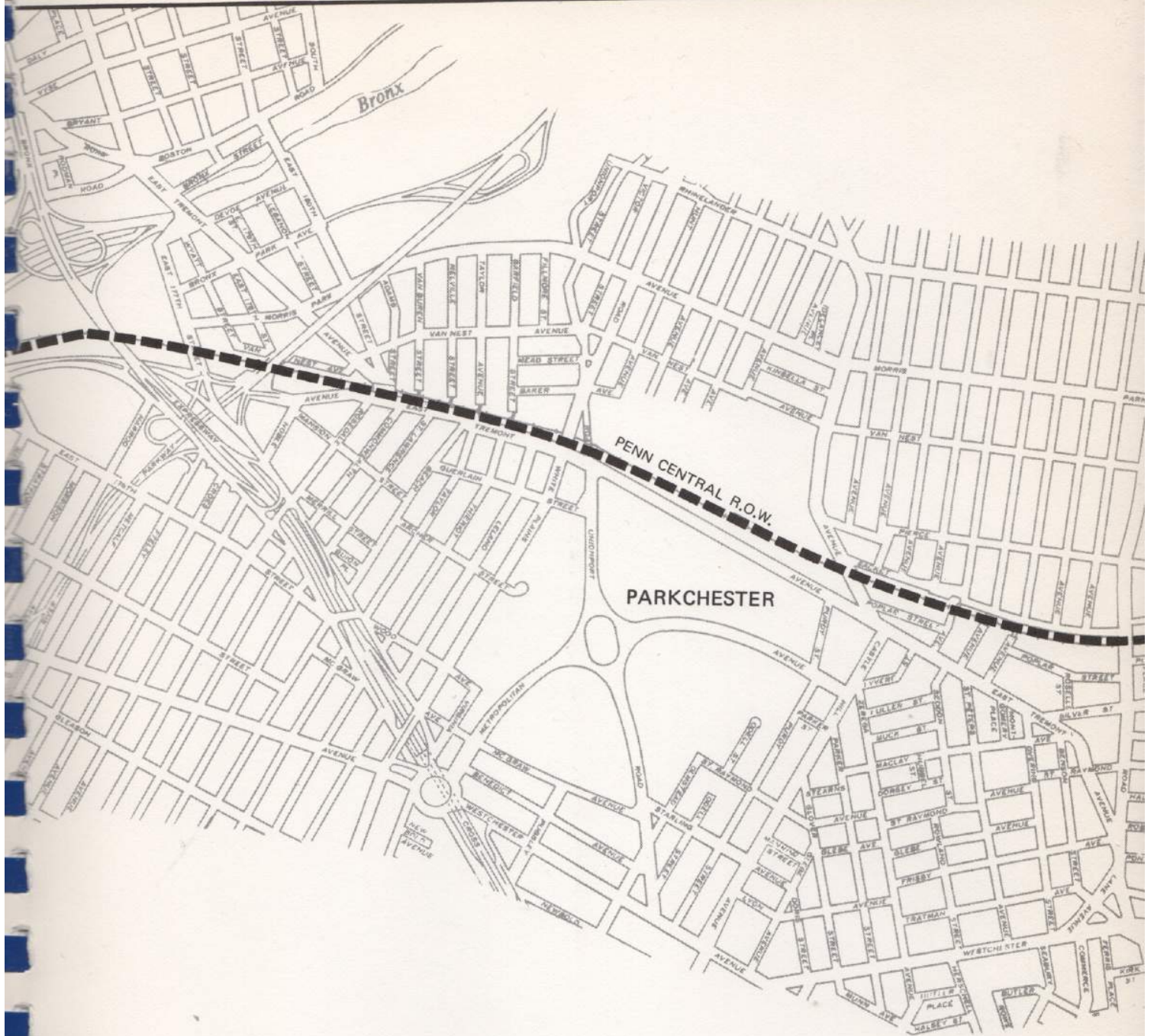
PELHAM CORRIDOR

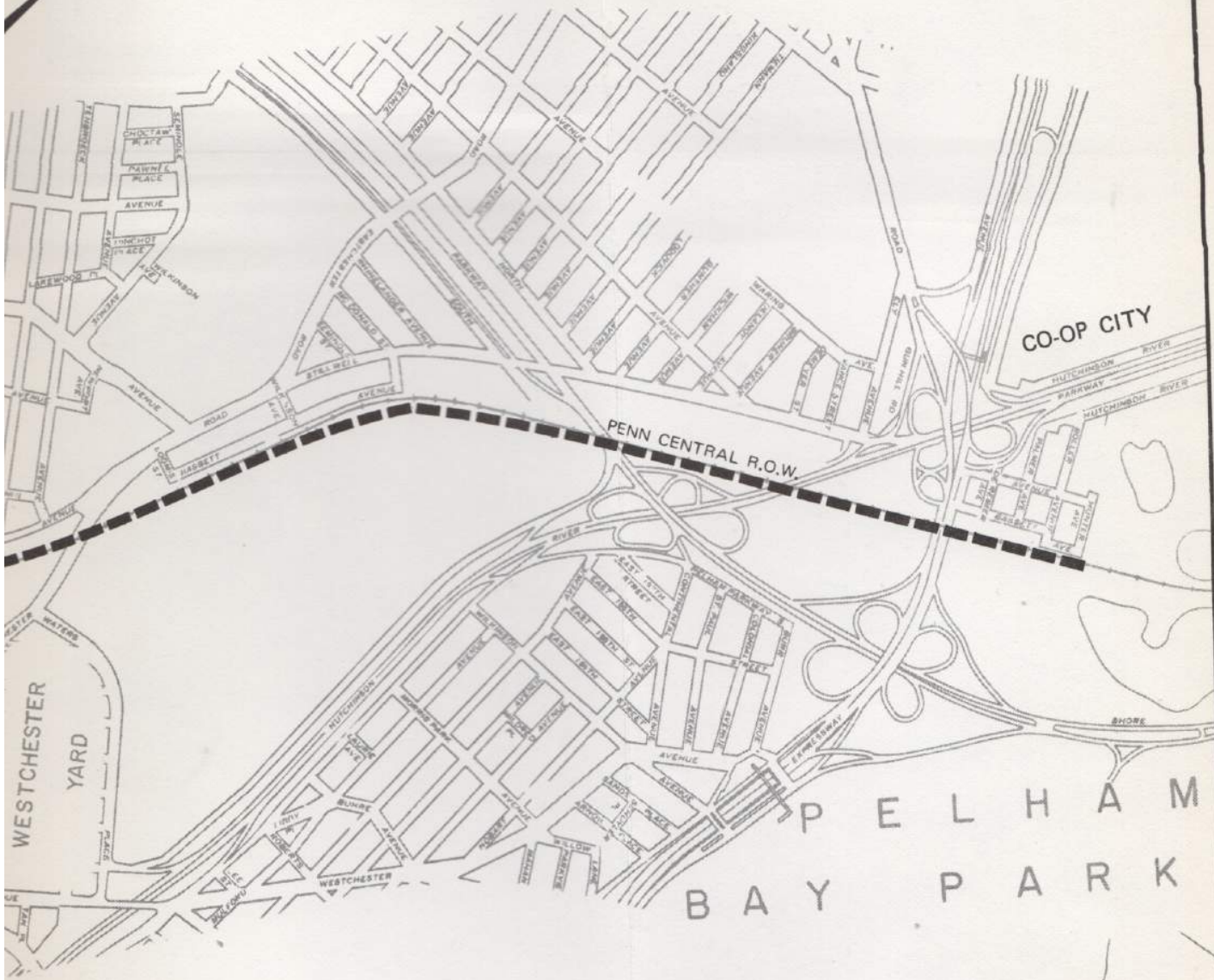
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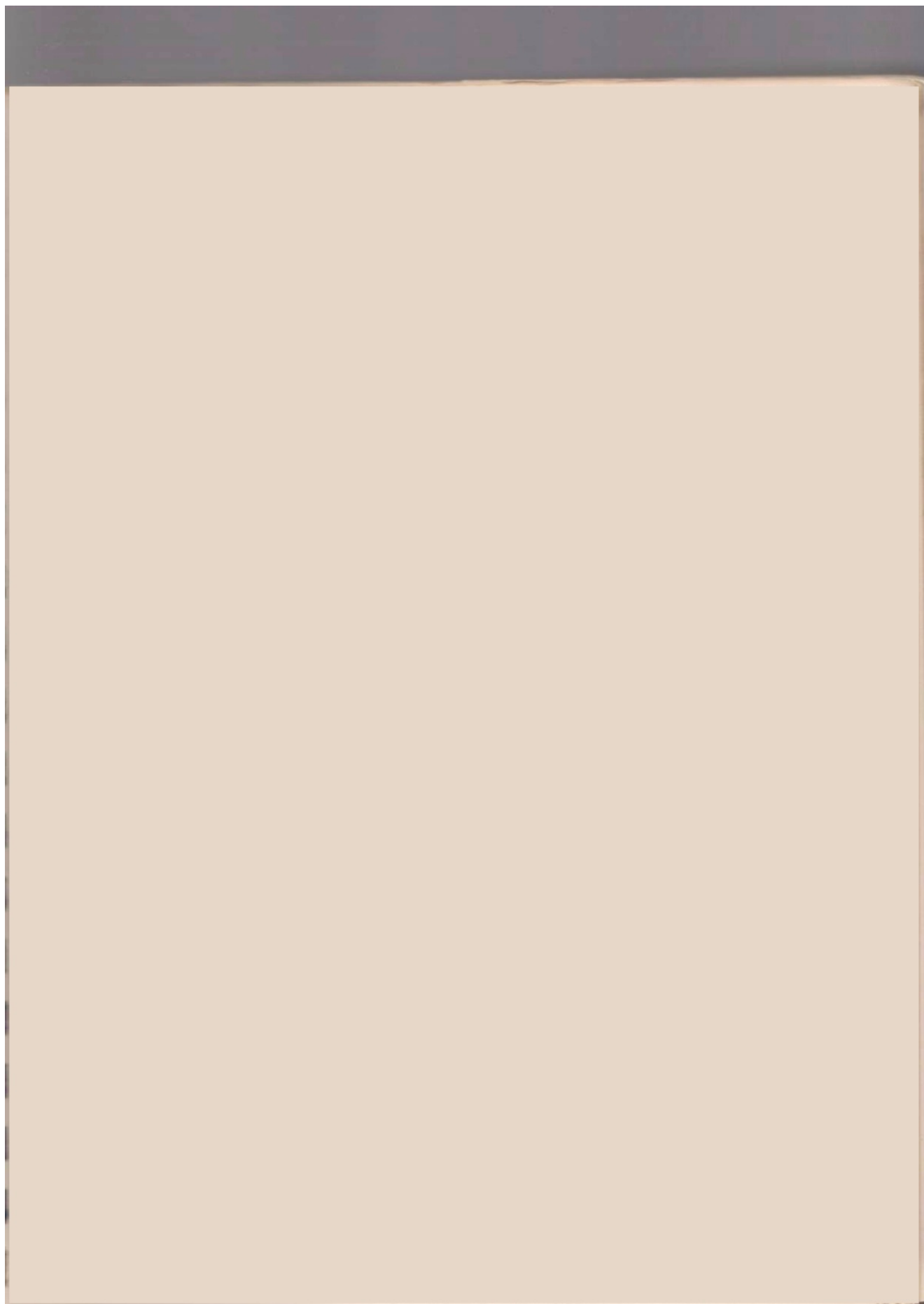


RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

PENN CENTRAL CORRIDOR

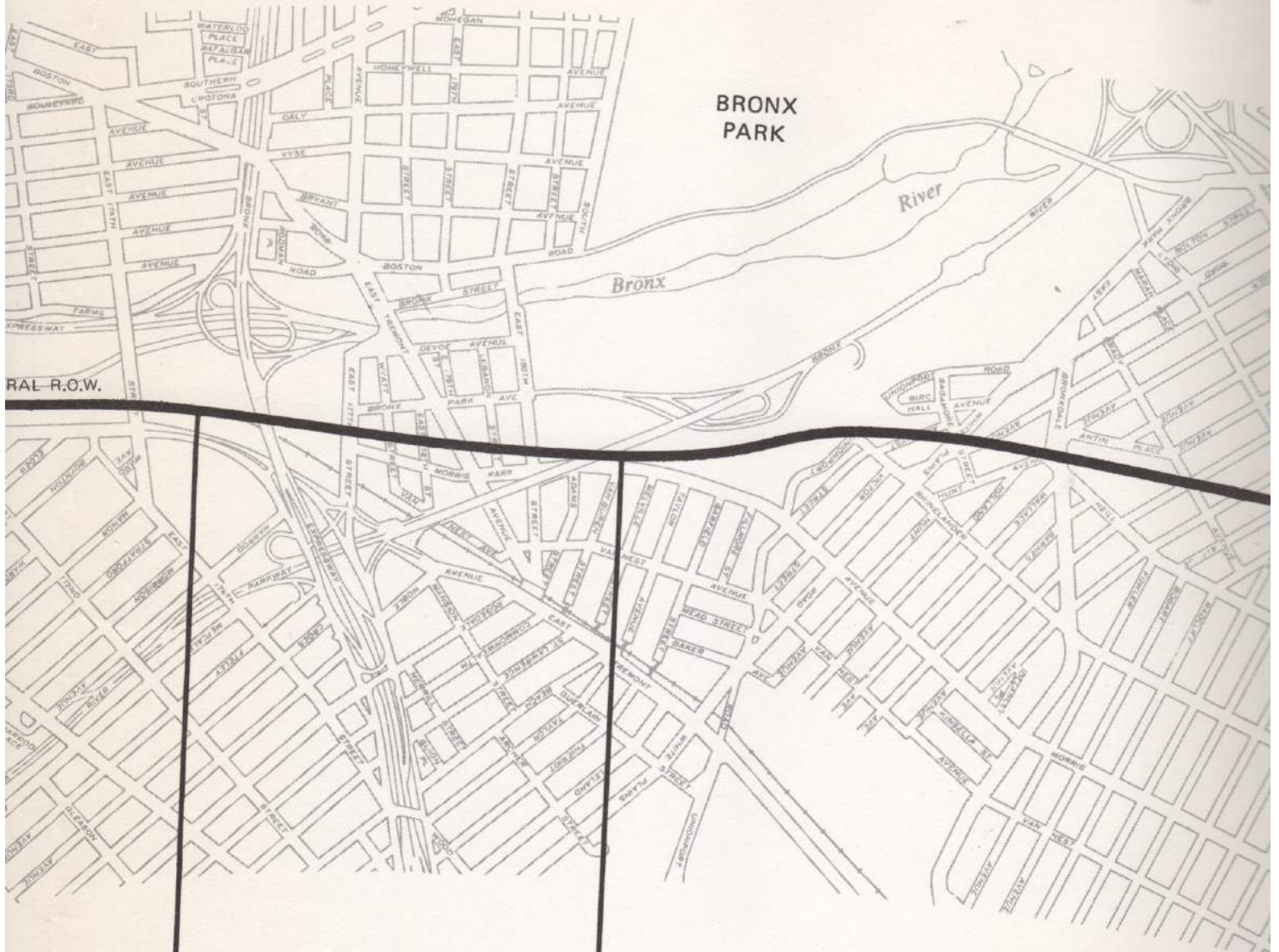
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PENN CENTRAL R. OF

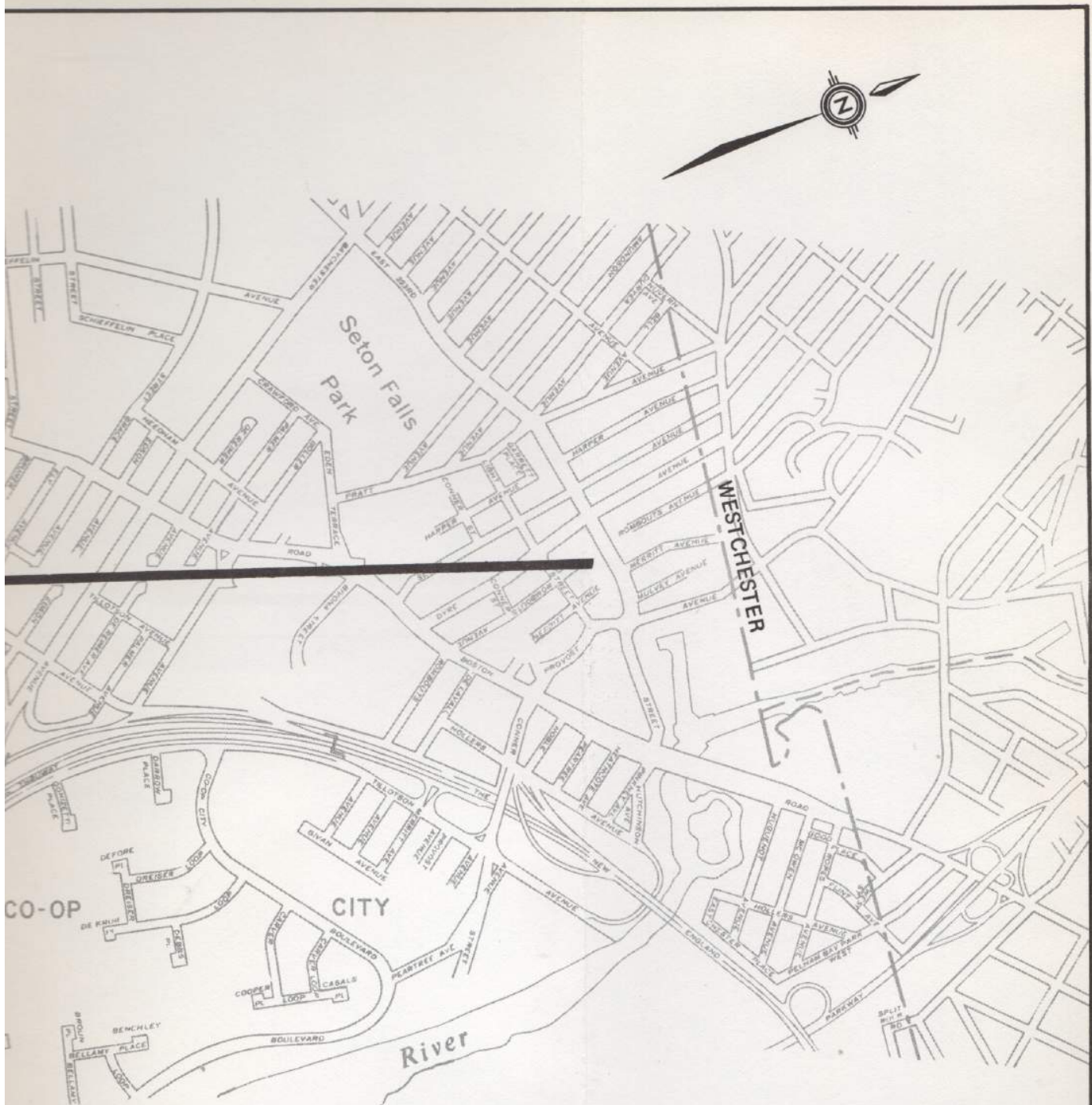


OF W.

TRANSIT AUTHORITY
CONNECTING TRACKS

EXISTING DYRE AVENUE LINE





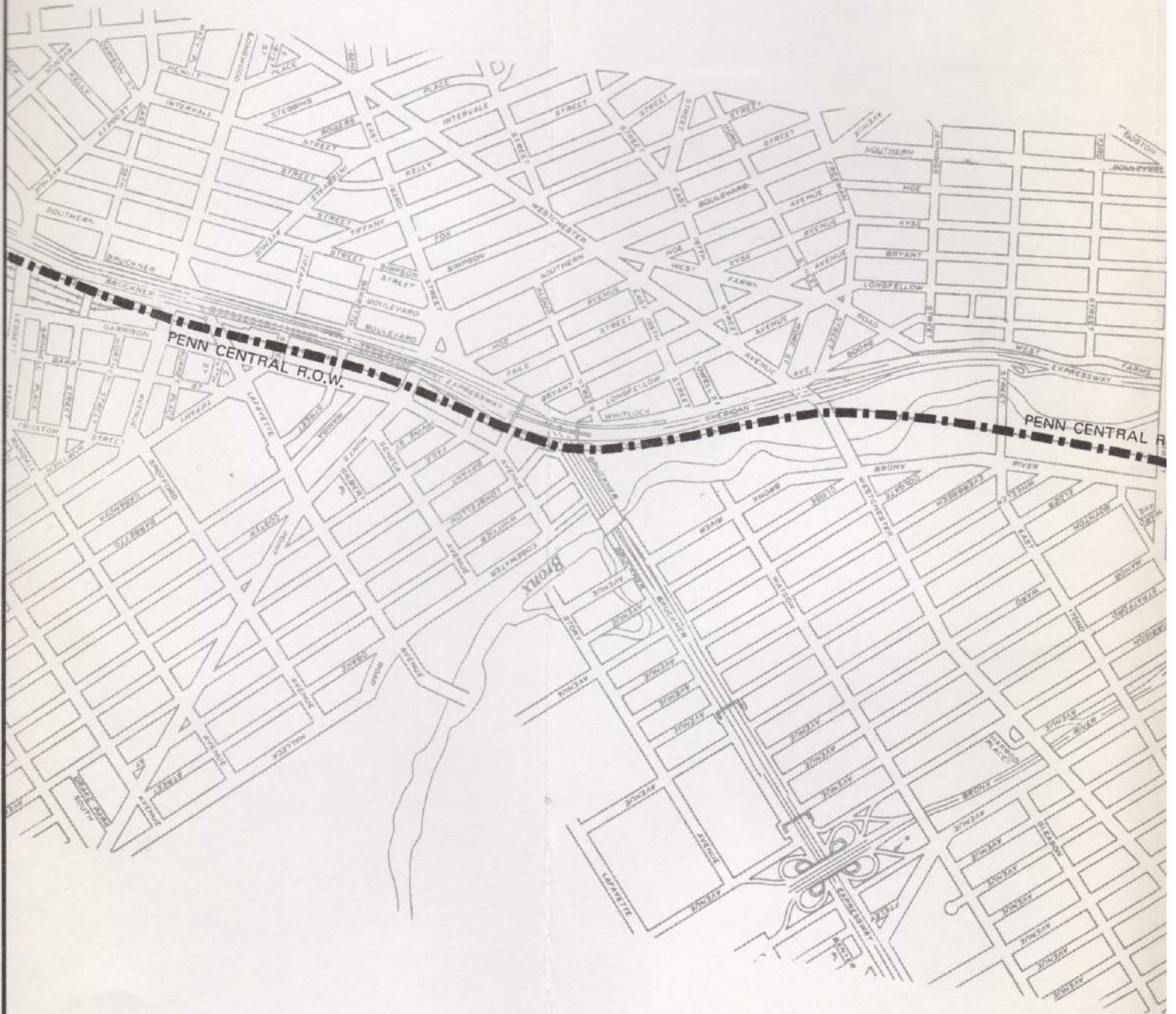
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

DYRE AVENUE CORRIDOR

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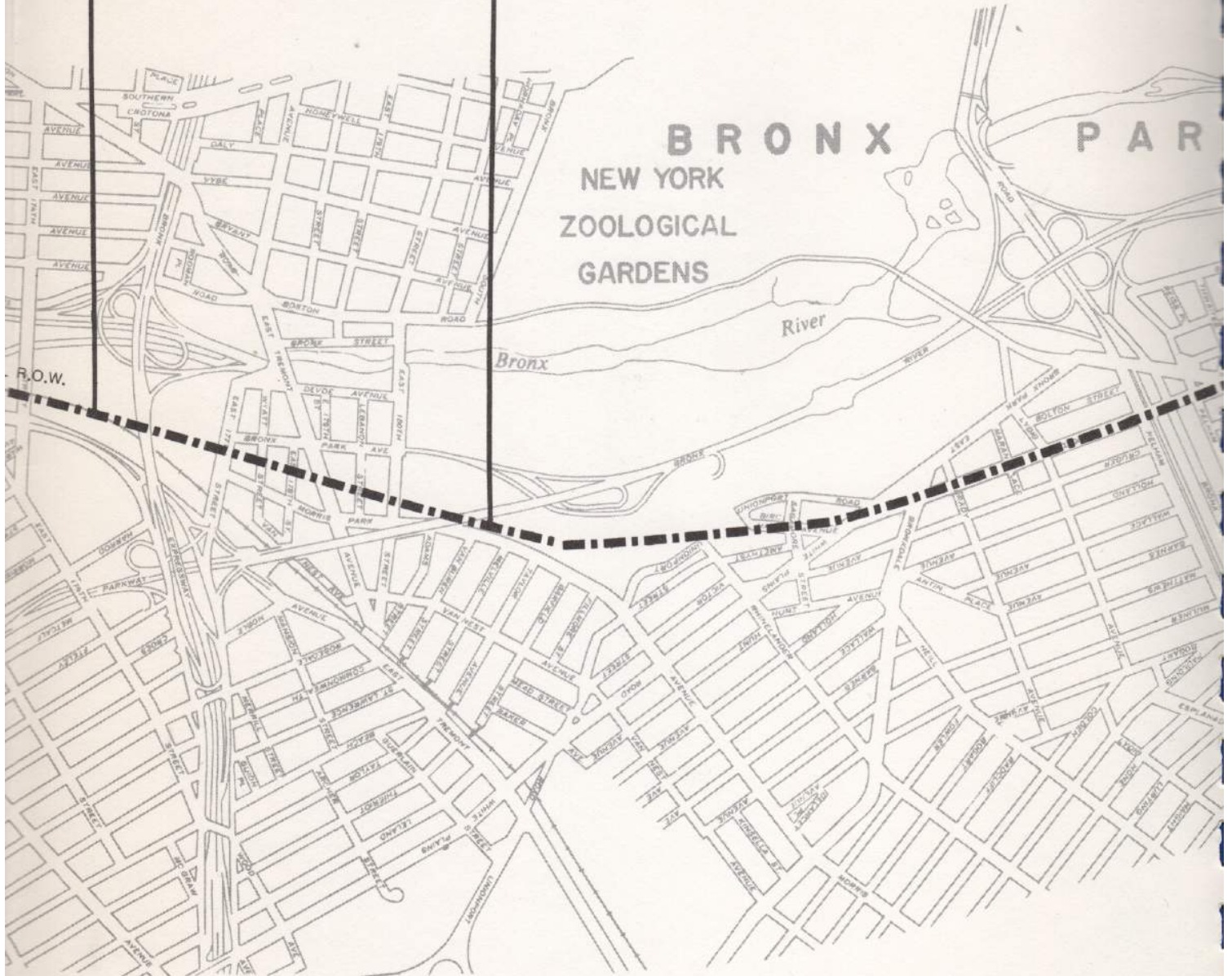
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PENN CENTRAL R. OF W.



TRANSIT AUTHORITY
CONNECTING TRACKS

EXISTING WHITE PLAINS ROAD LINE



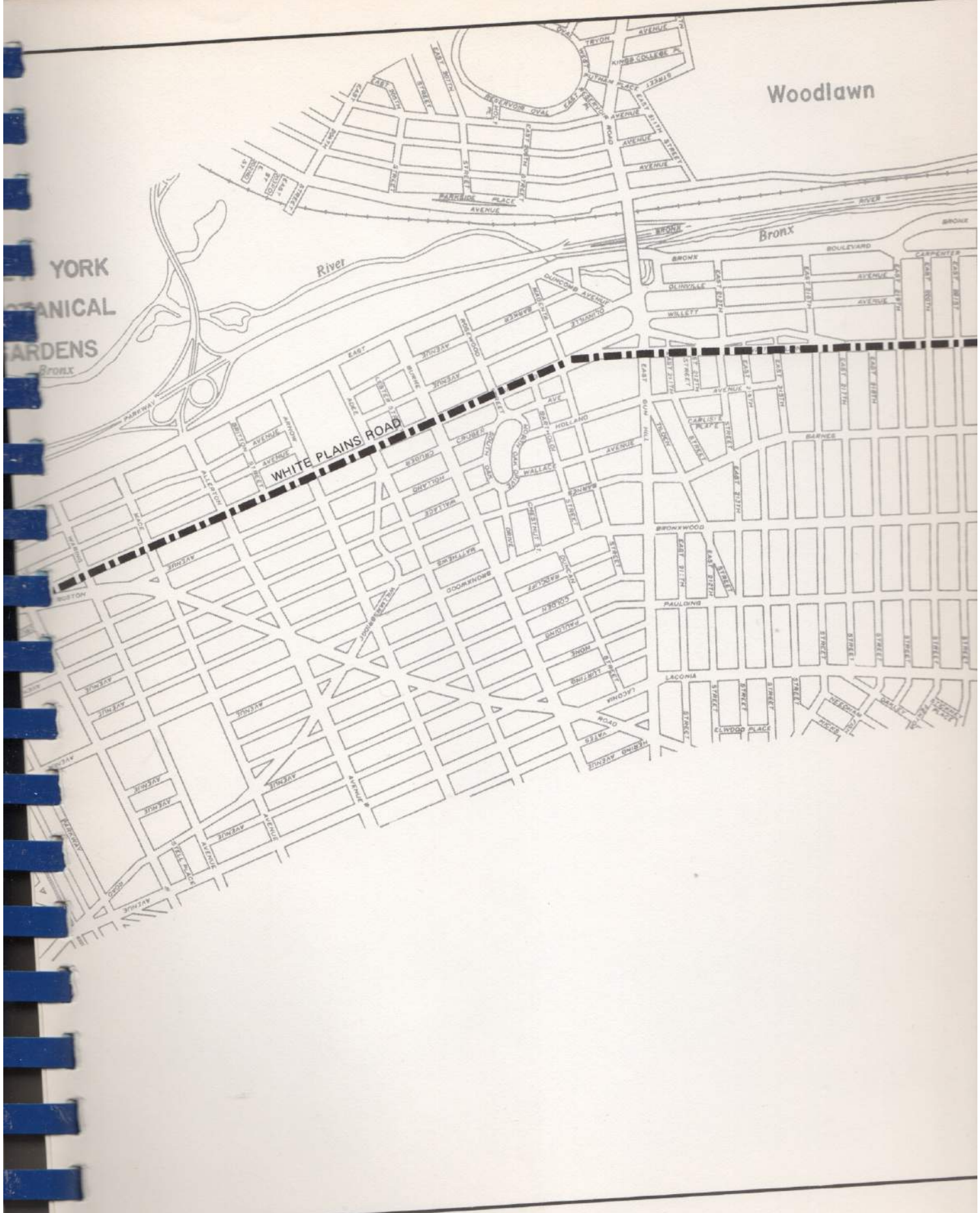
YORK
CANICAL
GARDENS
BRONX

Woodlawn

River

Bronx

WHITE PLAINS ROAD



tery

River

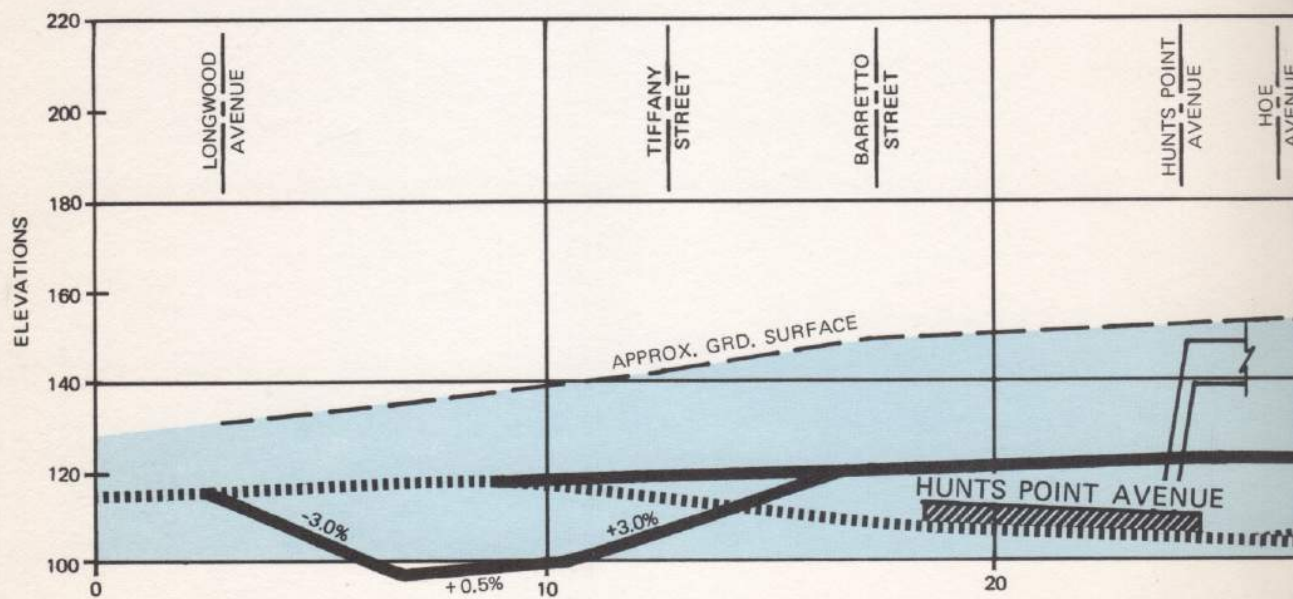
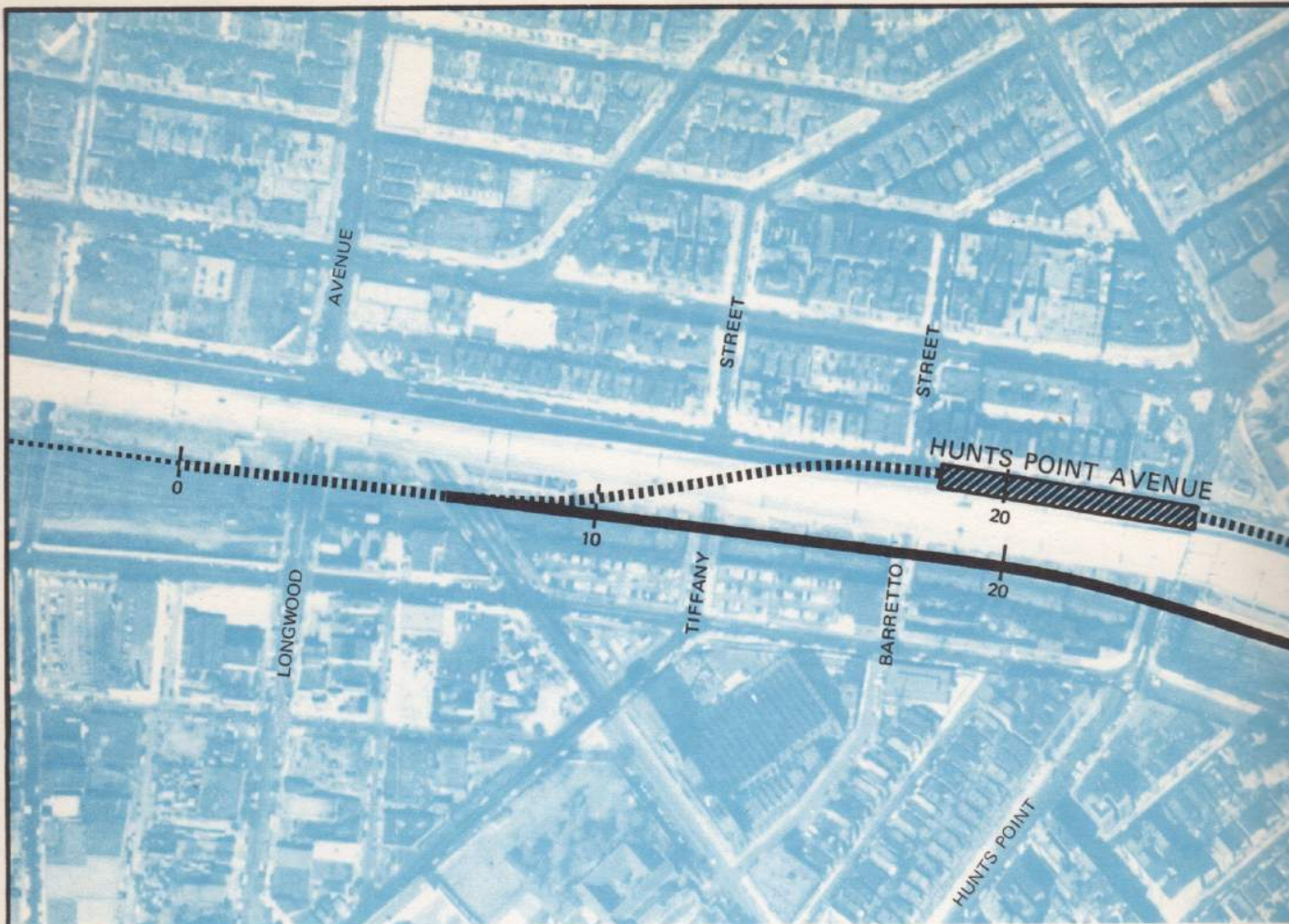
PLAINS ROAD

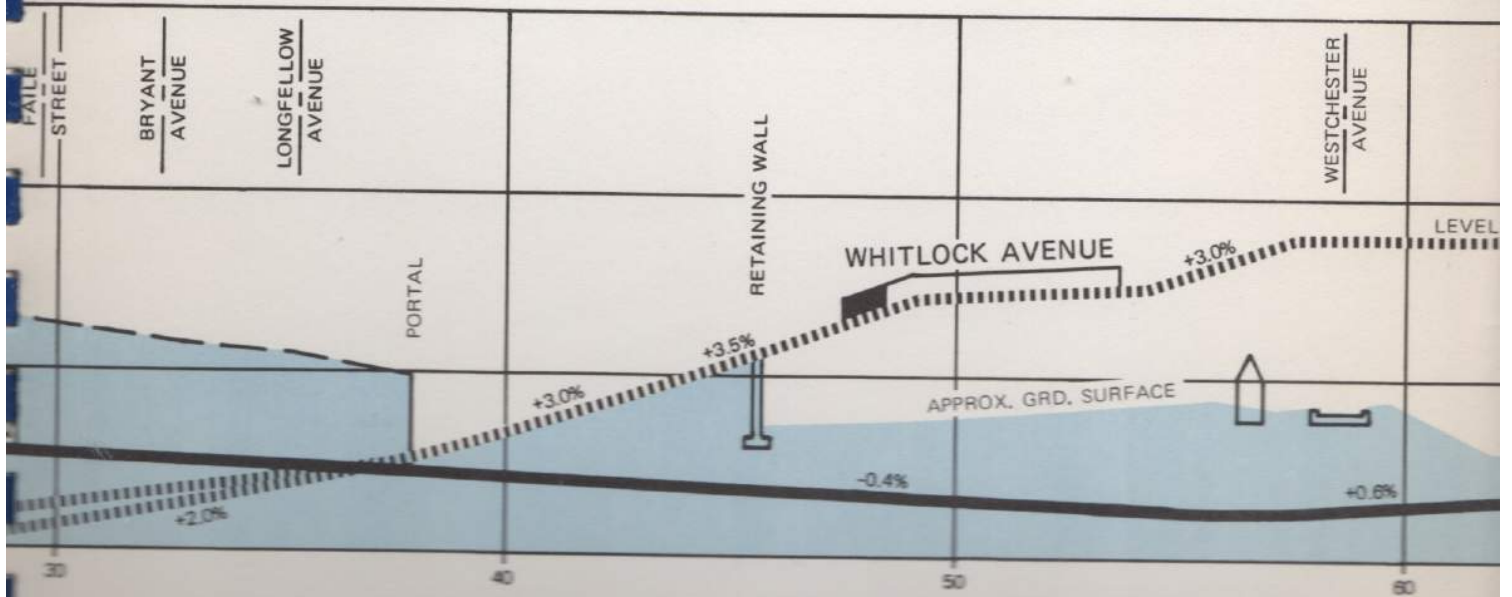
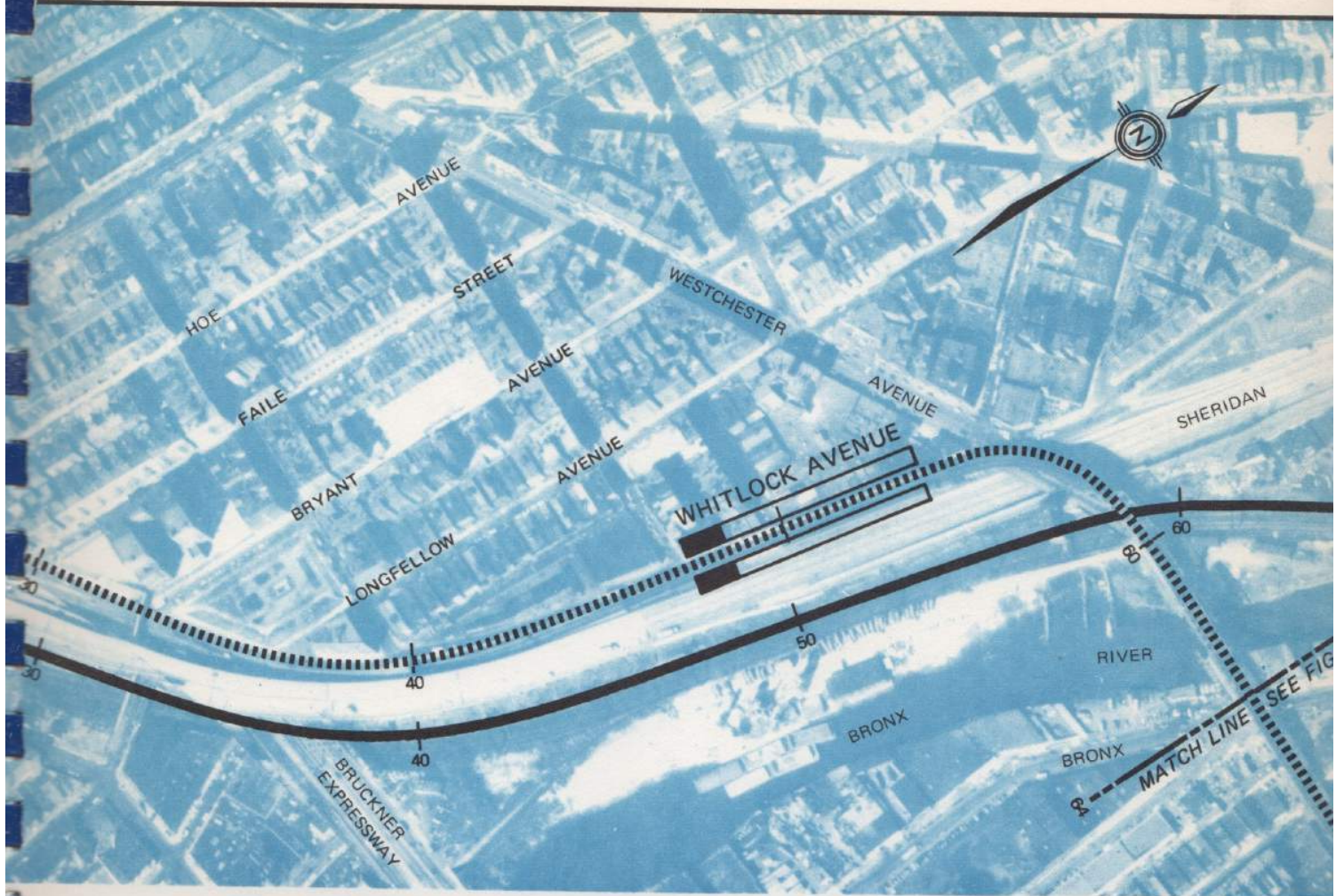


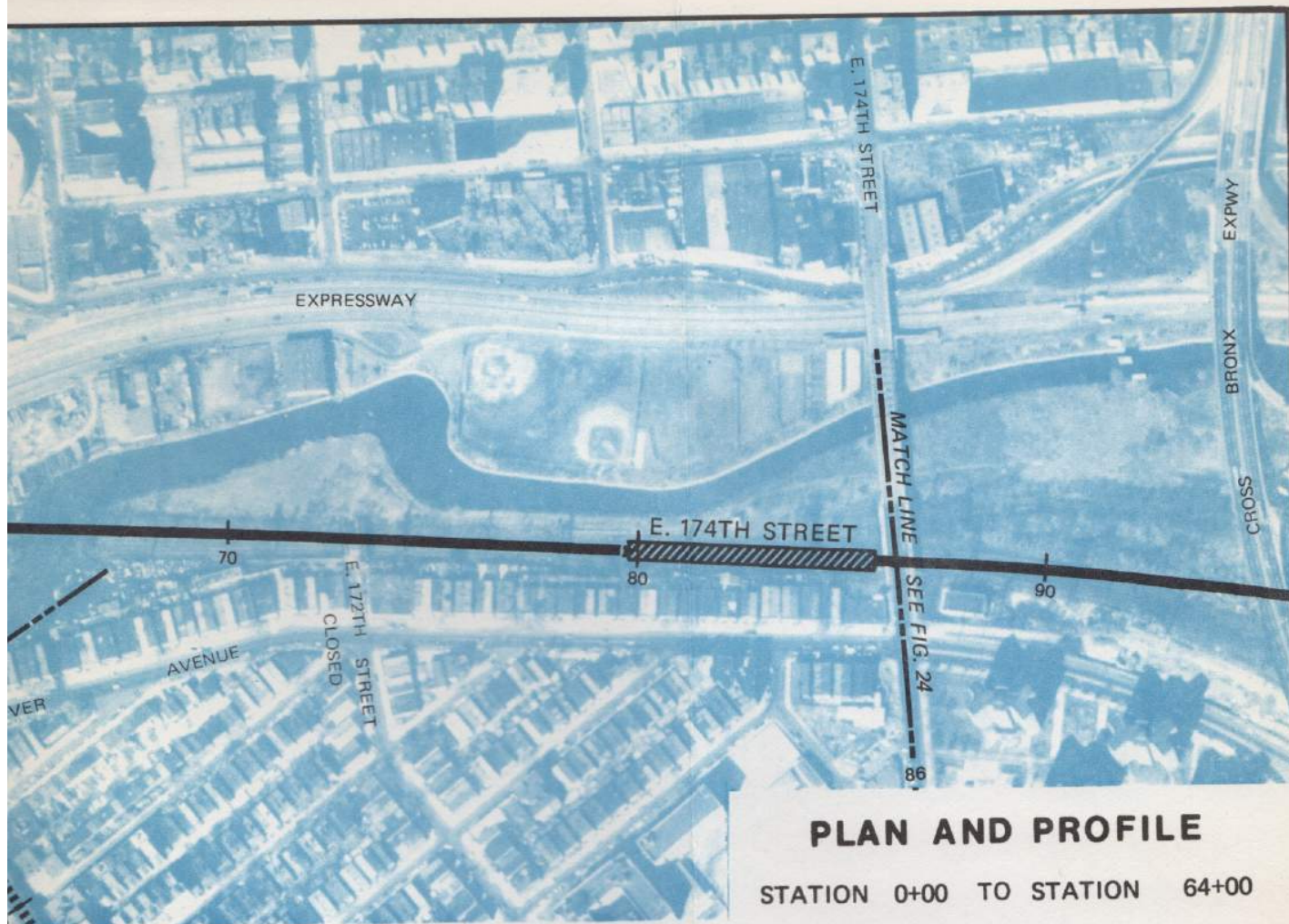
RAPID TRANSIT EXTENSION TO
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WHITE PLAINS ROAD
CORRIDOR

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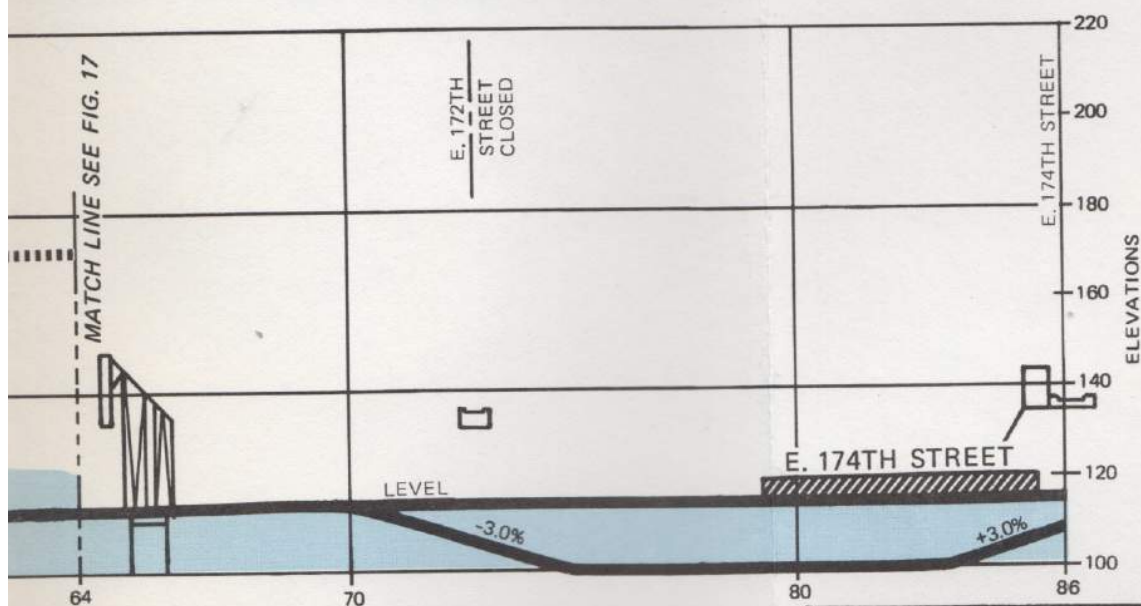






PLAN AND PROFILE

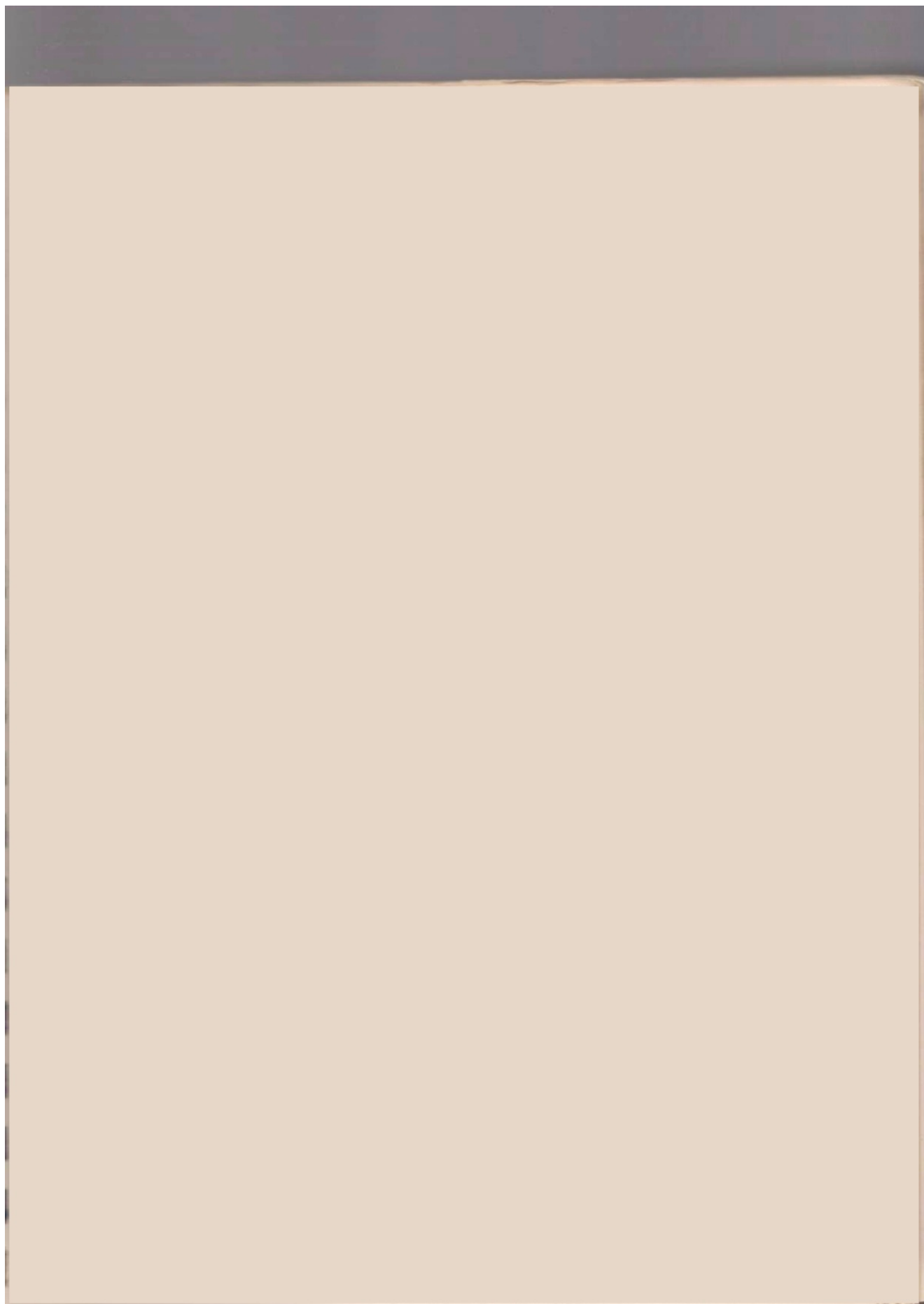
STATION 0+00 TO STATION 64+00

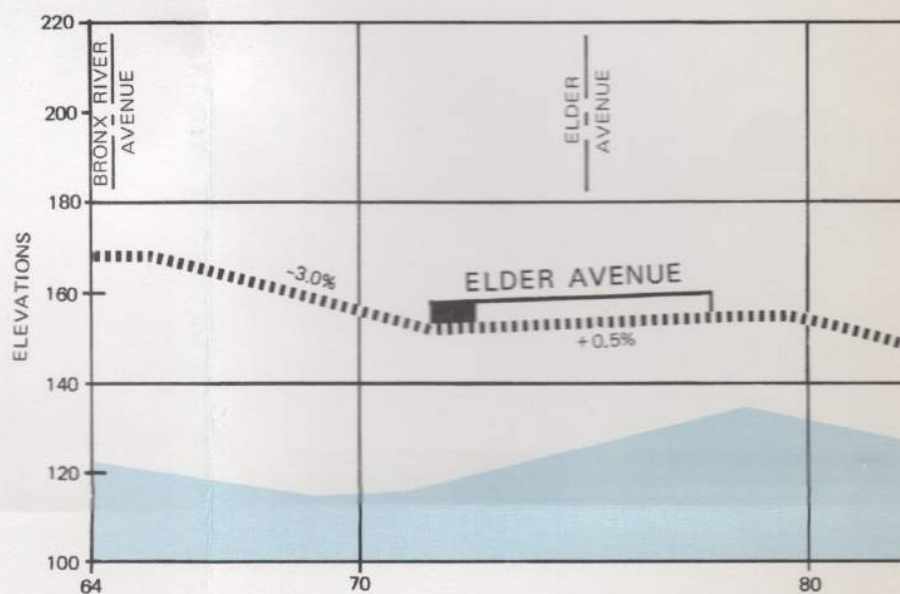


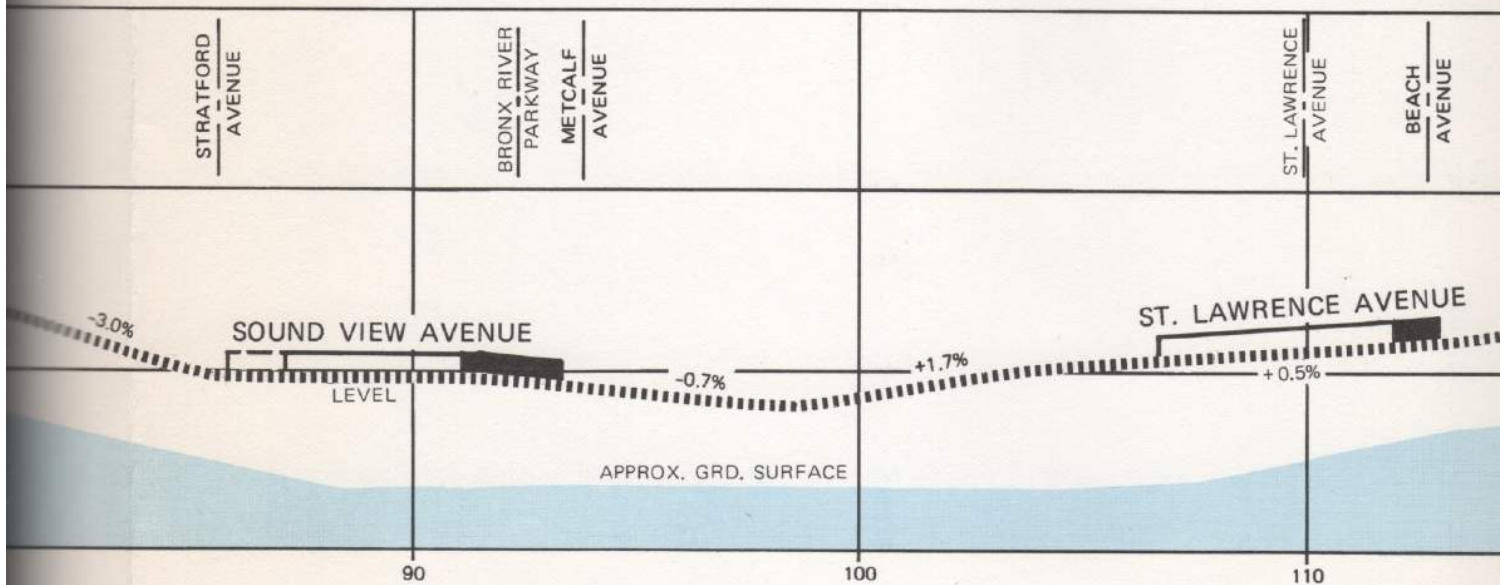
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
PELHAM CORRIDOR
LONGWOOD AVENUE
TO
BRONX RIVER AVENUE

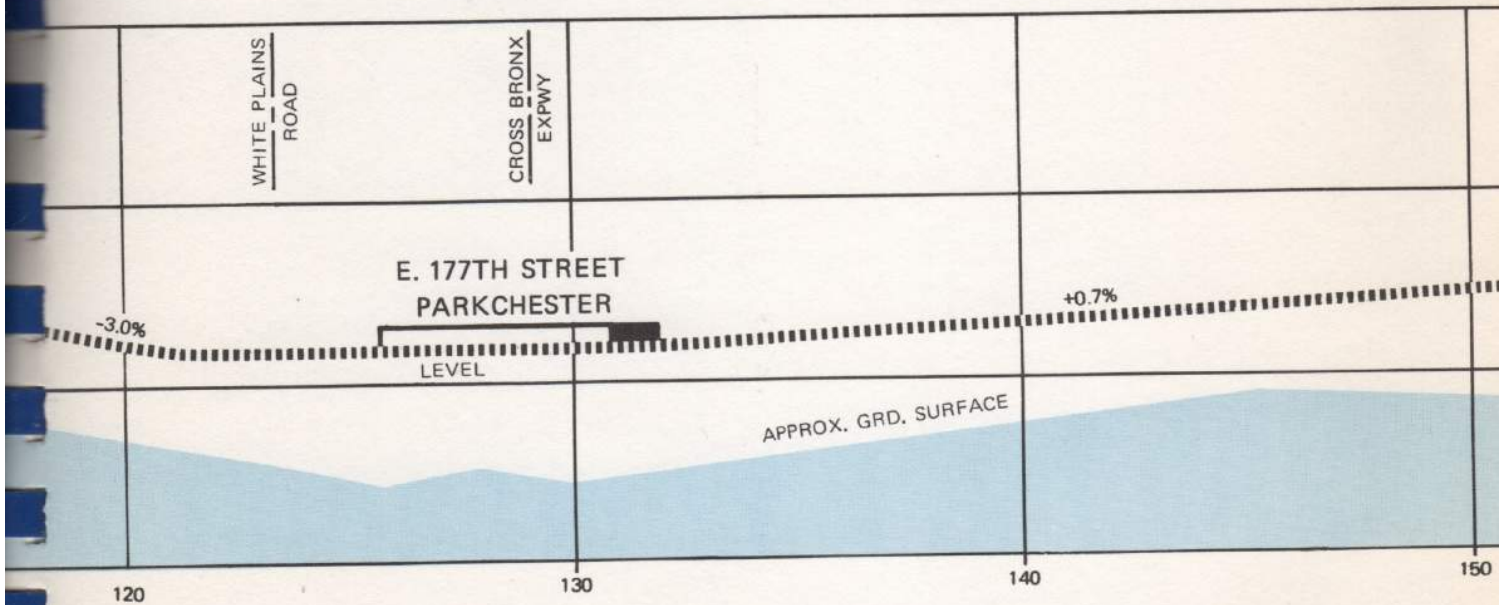
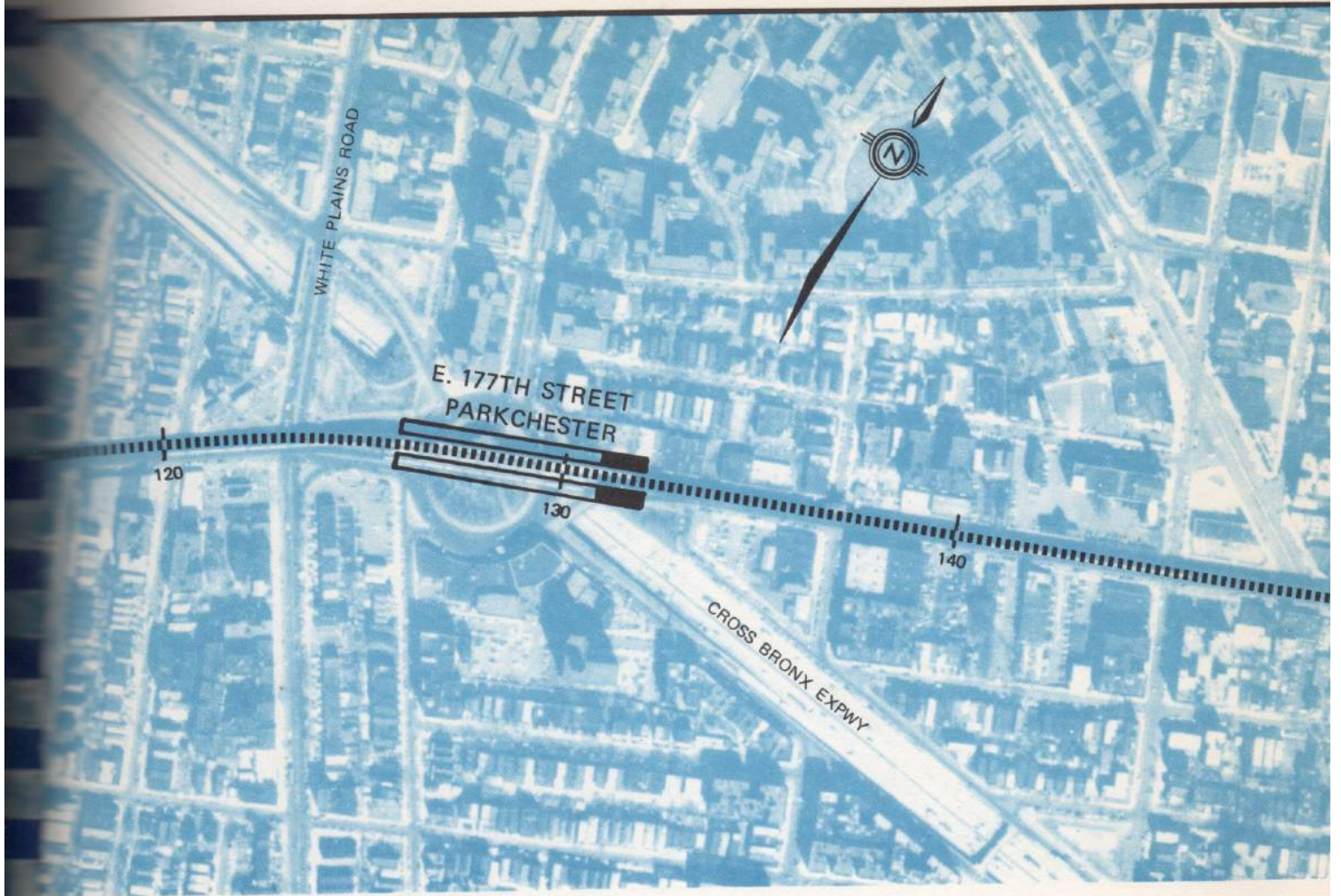
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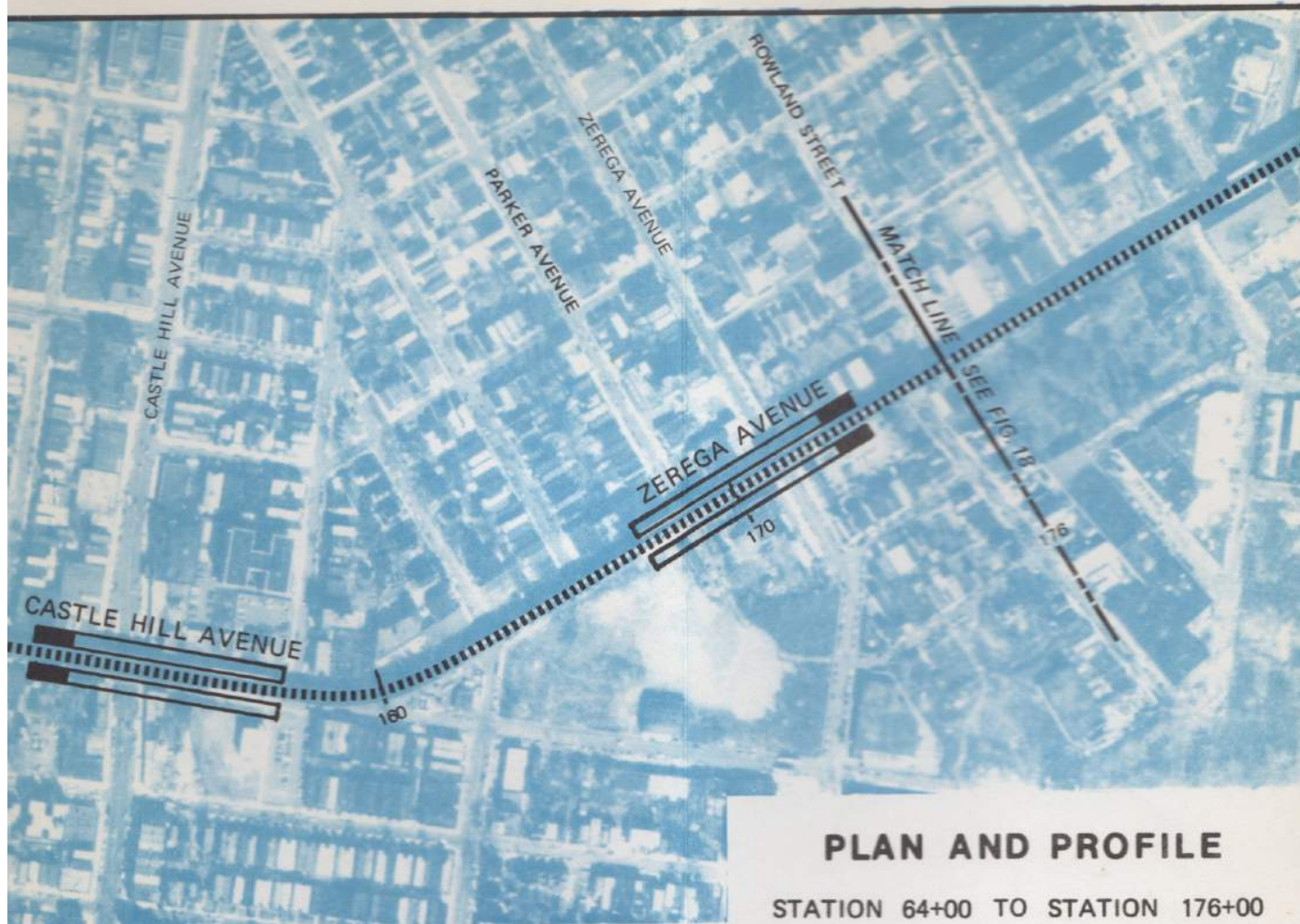
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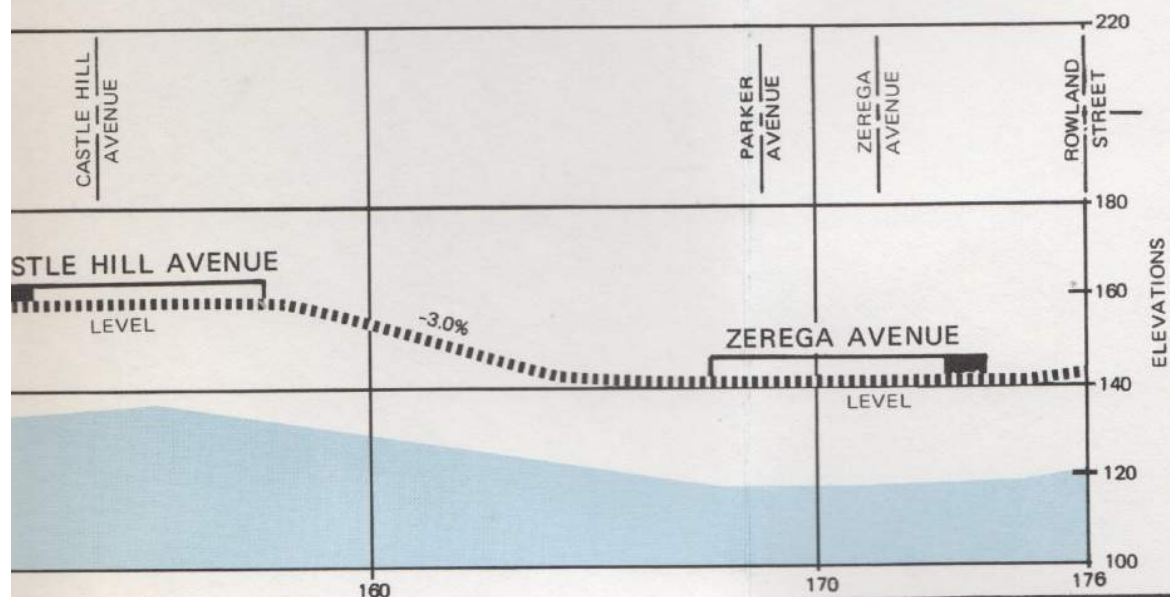






PLAN AND PROFILE

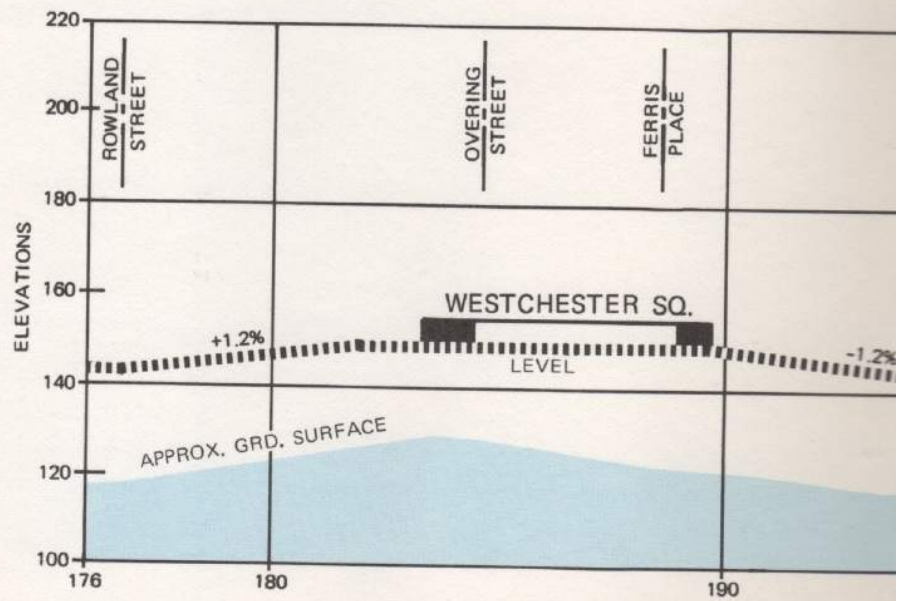
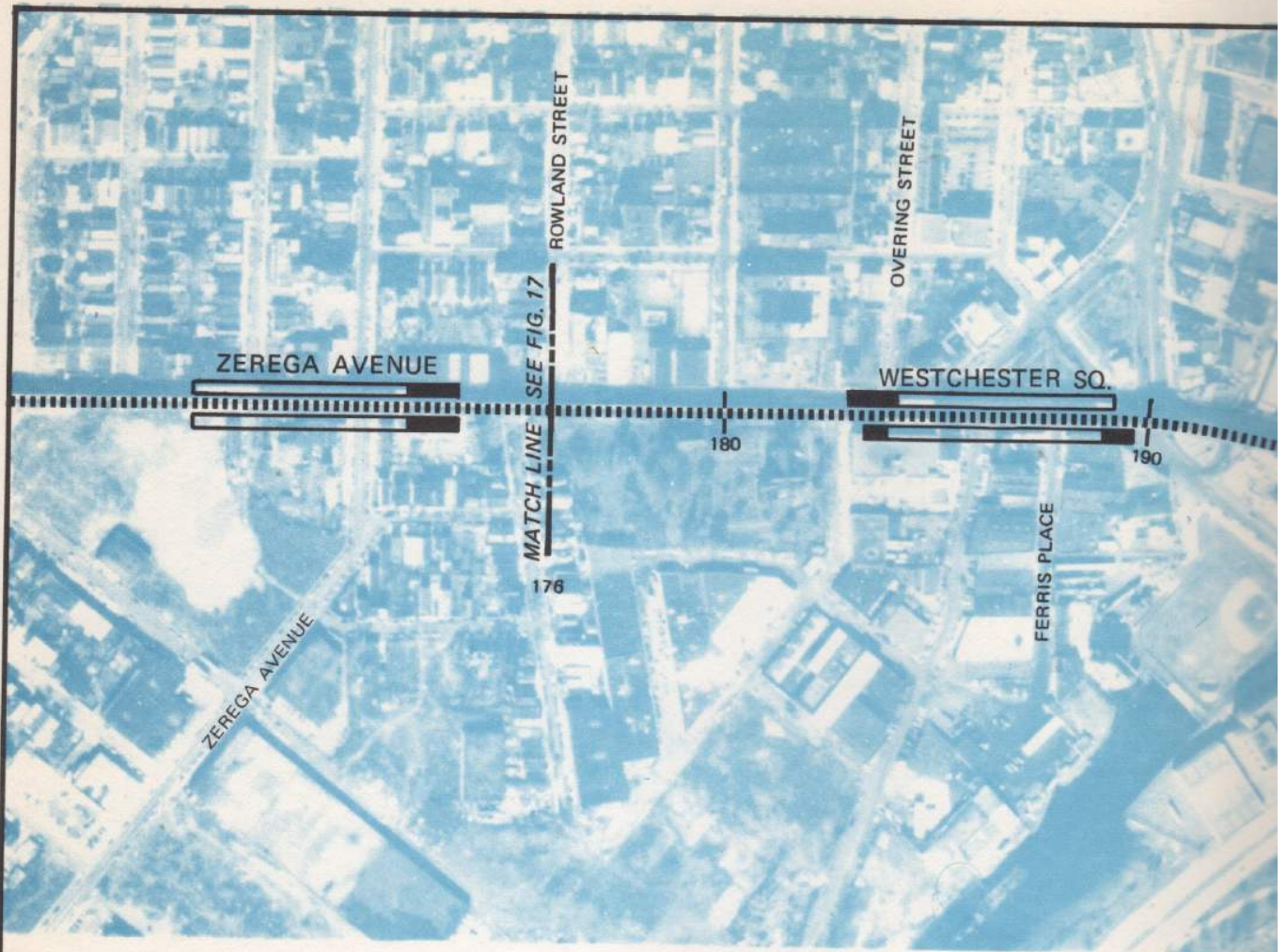
STATION 64+00 TO STATION 176+00

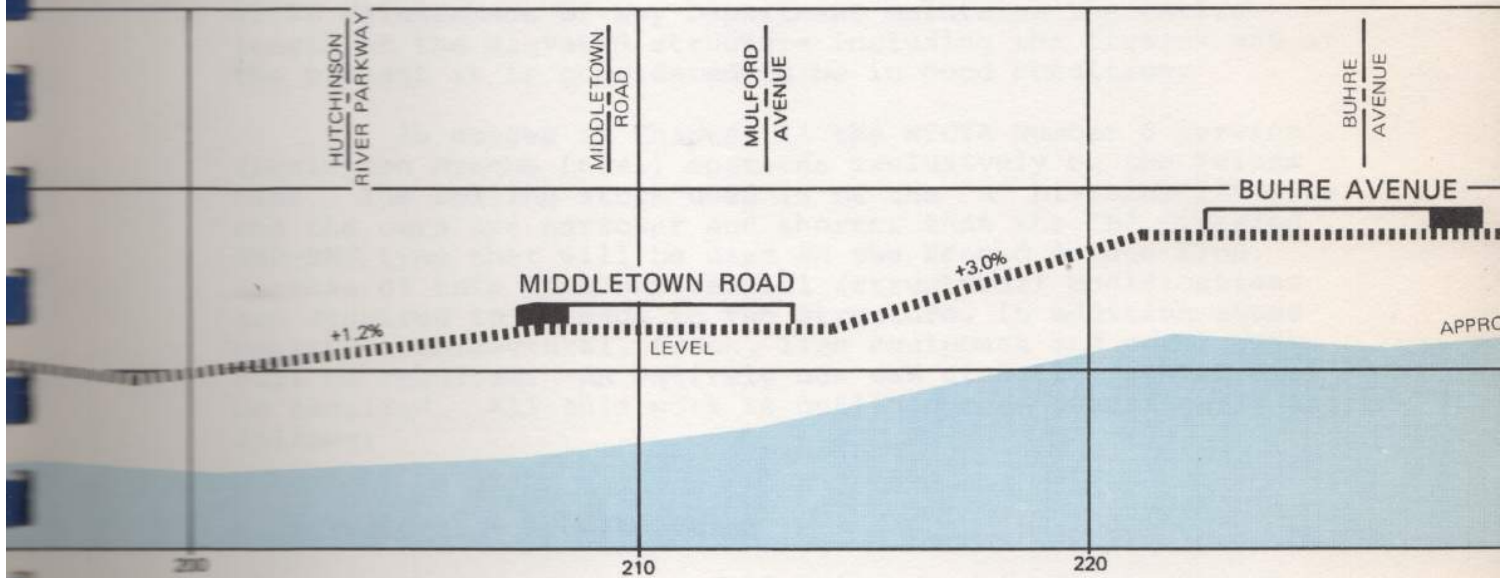


RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
PELHAM CORRIDOR
BRONX RIVER AVENUE
TO
ROWLAND STREET

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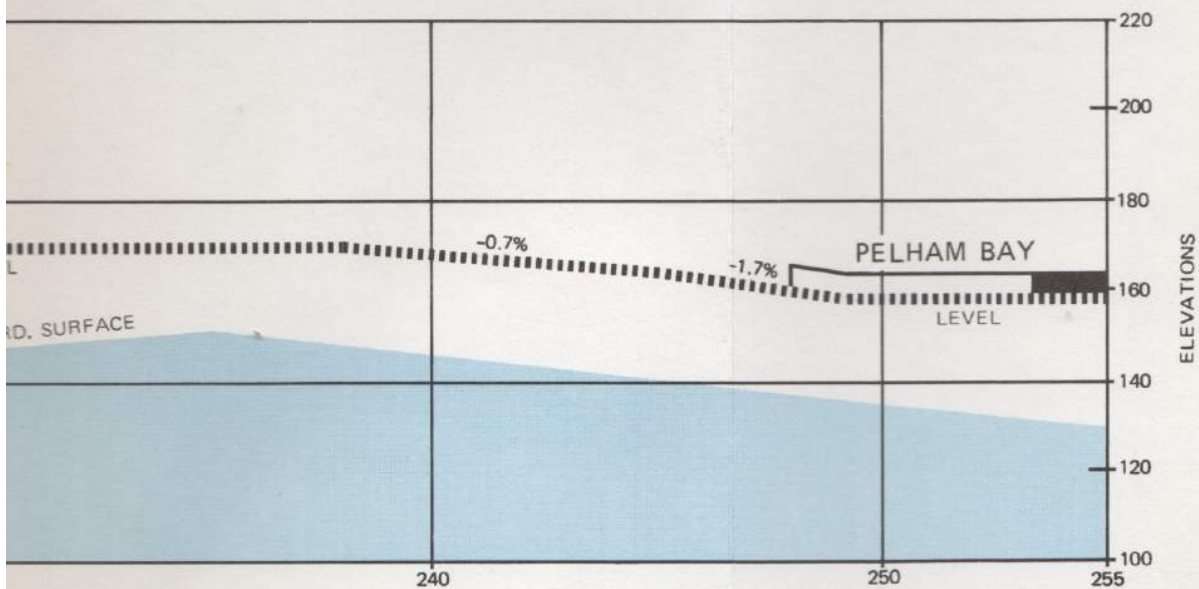






PLAN AND PROFILE

STATION 176+00 TO STATION 255+00



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
PELHAM CORRIDOR
ROWLAND STREET
TO
PELHAM BAY PARK

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The structure was designed and built by the New York State Public Service Commission between 1915 and 1920 and then turned over to the Interborough Rapid Transit Company for revenue operations. Its basic configuration consists of three tracks 12'-6" o.c. supported on longitudinal stringers which are connected to transverse girders supported by heavy built up street columns 26 feet apart and founded in the bed of Westchester Avenue. The track construction is typical elevated NYCTA open deck type with wood ties resting directly on the stringers. The standard bent spacing is 50 feet with the exception of areas at intersecting streets and station mezzanines where it is increased in multiples of 5 feet up to 75 feet as local conditions require. There are two areas where the construction differs from the typical, the first is the area over the Penn-Central Railroad ROW and the second is the area over the Bronx River. The NYCTA tracks are carried approximately 60 feet over the Penn-Central Railroad by a 160 foot span Pratt type truss and over the Bronx River they are carried approximately 70 feet above mean high water by a 220 foot Parker type truss.

Between Westchester Square and Middletown Road stations elevated lead tracks are provided in both the northbound and southbound directions from the main line to the adjacent NYCTA Westchester Yard. The lead tracks are of elevated steel bent type construction and continue into the yard where they connect to tracks that are on grade. The NYCTA Maintenance of Way Department maintains the entire length of the elevated structure including the trusses and at the present it is considered to be in good condition.

As stated in Chapter II the NYCTA Number 6 service (Lexington Avenue Local) operates exclusively on the Pelham Line. The rolling stock used is of the "A" Division IRT type and the cars are narrower and shorter than the "B" Division IND-BMT type that will be used on the Second Avenue Line. Because of this fact substantial (structural) modifications are required to be made to the structure, in addition accompanying architectural, track, line equipment and power work will be required. An entirely new cab signaling system will be required. All this work is outlined more specifically as follows:

a. Structural - Architectural

The structural modifications required are necessary because the Second Avenue Line cars will have "B" Division

dimensions, that is they will be 10 feet wide and be operated in 8 car 600 foot long trains. Presently the existing stations can accommodate "A" Division cars of 9 foot width and 10 car 515 foot long trains.

The existing station platforms are all 525 feet in length and all require to be extended to 615 feet. The side clearance would have to be increased by approximately 6 inches. The existing track spacing of 12'-6" between stations is sufficient for the wider cars, also at areas of horizontal curvature sufficient additional track spacing is provided for new cars.

The adequacy of the main members of the structure to carry the new cars was investigated and found to be satisfactory. The reason for this is that a typical "A" Division ten car train fully loaded and made up of R-28 type cars weighs approximately 1900 lbs/ft., this is higher than a typical "B" Division 8 car R-44 type train which weighs approximately 1500 lbs/ft. In addition the R-44 car trucks are 55 feet apart versus 36 feet for the IRT type cars and this induces smaller bending moments on the longitudinal track stringers. The original structure was designed for a high impact factor, the R-44 type cars would lessen this factor since they have better suspensions, smoother acceleration and deceleration characteristics, and wheels that will be maintained to very high standards, which will be the policy of the NYCTA on all rolling stock in the near future.

As indicated on Figure 16, Figure 17, and Figure 18, the basic platform extension length is 90 feet (615-525) the direction in which a platform is extended depends basically on horizontal and vertical alignment considerations and the impact on appurtenant line equipment. One major exception is the Sound View Avenue Station where approximately 140 feet of platform would have to be abandoned in the southbound direction and about 230 feet of new platform would have to be provided in the northbound direction. This is required to maintain a minimum of 917 foot distance between the Elder and Sound View Avenue Stations for signaling purposes. The new platforms will be supported on longitudinal girders which will in turn be supported on new cantilever girders connected directly to the existing bent columns of the elevated structure. New columns will not be required, the existing structure has sufficient reserve capacity to carry the additional loading imposed by the platform extensions.

Figure 19 indicates some typical sections through the existing and proposed elevated platforms and the necessary lateral clearance required for R-44 type cars. As indicated the existing platforms will require cutting back approximately 6 inches, in addition certain sections will require widening to remove the tapered areas which presently exist at the end of the stations. The existing platforms are all of the precast concrete type and it is possible to cut them back and still maintain their structural integrity. As with all NYCTA stations a new 3-1/2 inch wood platform edge will be applied after the proper structural clearances have been provided. For a period of time after the platforms are cut back a temporary 6" wide removable gap filler will be required at all stations until the conversion is made from "A" Division to Second Avenue Line operation.

Architecturally all the existing station mezzanines will be completely refurbished. This will include new controls, new change booths, fluorescent lighting, new toilet facilities, new roof drainage and painting of all exterior and interior surfaces.

At the terminal station at Pelham Bay Park it is necessary to extend the platforms in the northerly direction to avoid relocating the diamond crossover at the south end of the station. This will require the existing trainmasters and police quarters to be reconstructed one level above the new platform extension. A new street level control area can then be provided together with an escalator up to the center platform of the station. The existing mezzanine level control area can be refurbished and controls rearranged to provide separate use of this area by passengers entering the station directly from a pedestrian overpass over Bruckner Boulevard. This work will have a very significant effect in improving the passenger flow and distribution during peak periods at this heavily used terminal station.

b. Track

In converting the Pelham Line to "B" Division (Second Avenue Line) operations the existing track work can remain as is. This is because both NYCTA Divisions operate over standard gauge track (4'-8 1/4") and use 100 lb. ARA Type B running rails. Both Divisions also use a 150 lb. steel contact rail (third rail), however, the existing rail would require a lateral adjustment of 1-9/16" and a vertical adjustment of 1/2" to be compatible with "B" Division standards.

Presently the entire length of track including the special work areas are maintained by the NYCTA Maintenance of Way Department and are considered in good condition.

The only track modifications that will be required are in connection with the platform extensions. In the areas of Westchester Square, Middletown Road and Buhre Avenue stations the existing superelevation will have to be removed to reduce excesses at the extended platforms. This will reduce the operating speed by approximately 5 MPH in these areas, however, this will not have a significant affect on any operations on the line.

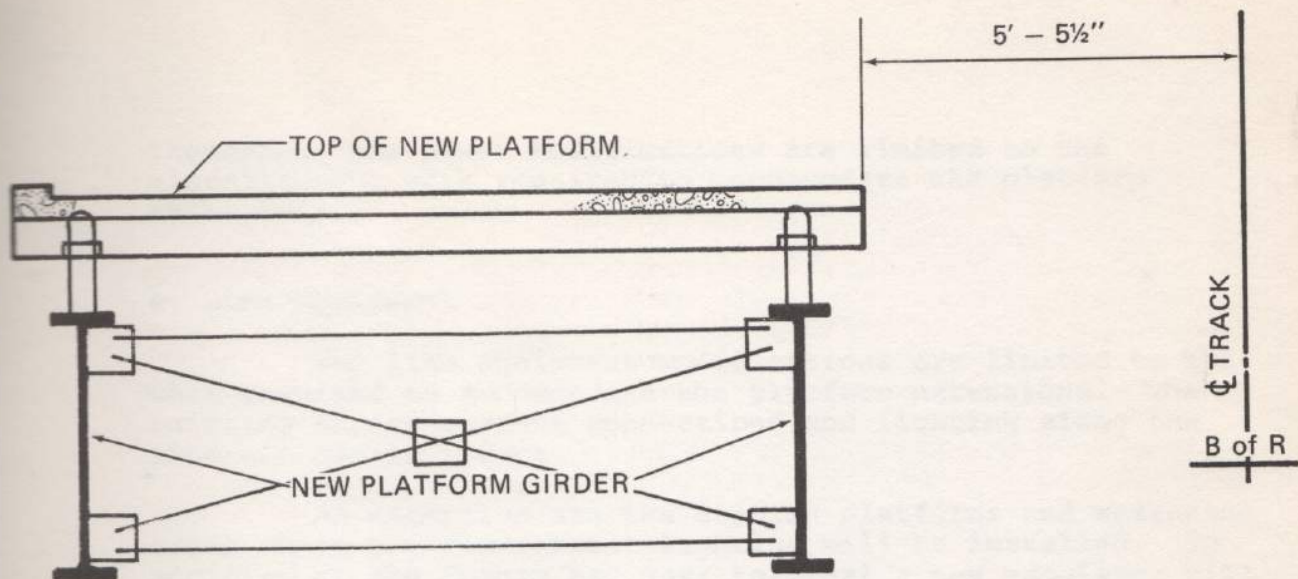
c. Signals

The existing wayside signal system on the two outside local tracks will require removal and replacement with a cab signaling system to make the line compatible with Second Avenue. The middle express track will require both wayside and cab signaling in two directions between Whitlock Avenue and Westchester Square. This is necessary because the track will have to double as a lead to Westchester Yard for the remaining IRT operation south of Hunts Point in two directions and also as an emergency bypass for the Second Avenue Line operation in two directions between Whitlock and Westchester Square. The middle track north of Westchester Square to Pelham Bay Park will require cab signaling and could be used for layup of Second Avenue Line trains during the midday.

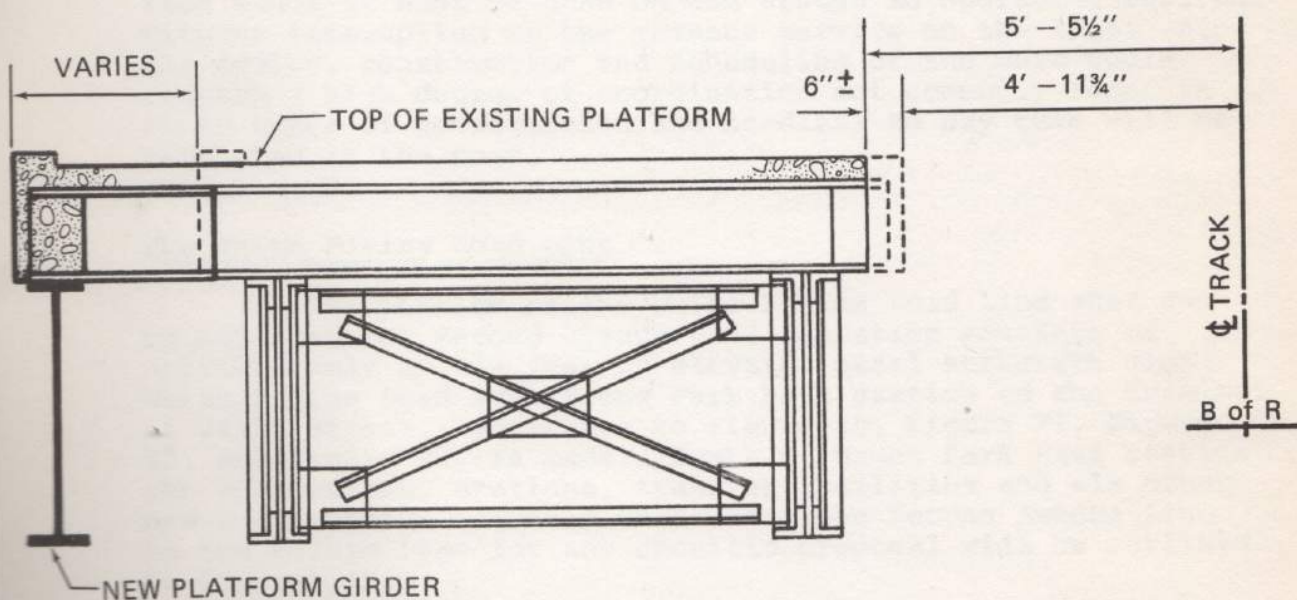
In addition to the new cab signaling the existing wayside system will have to be modified to accommodate the platform extensions. At some specific period in time both the wayside and cab signaling systems will be in place and it is during this period that the conversion from "A" Division to "B" Division operation can take place. Subsequent to this, the wayside system can be removed and all salvageable parts and materials can be retained by the NYCTA.

d. Power

Both Divisions use 600 volt direct current for traction power supplied by substations to the operating lines. Presently on the Pelham Line north of Hunts Point Avenue three substations are in use. This is sufficient for any proposed Second Avenue Line operation since the peak hour service on the line will decrease from the present 27 to 15 trains per hour.



NEW PLATFORM SECTION



EXISTING TAPERED PLATFORM SECTION

Therefore, the power modifications are limited to the miscellaneous work required to accommodate the platform extensions.

e. Line Equipment

The line equipment modifications are limited to the work required to accommodate the platform extensions. The existing direct current connections and lighting along the line can remain intact.

An exception are the station platforms and mezzanine areas where new fluorescent lighting will be installed. In addition at the Pelham Bay Park terminal a new escalator will be provided as previously mentioned.

In summary all the work required to convert the Pelham Line to Second Avenue Line operations is feasible and precedent for it exists since on July 24, 1948 the then IRT Astoria Elevated Line was converted to BMT operations. However, it cannot be considered as typical new route construction since it must be done on and around an operating railroad without interruption to the revenue service on the line. Also the design, construction and scheduling of the work would require a high degree of coordination not commonly found in other types of construction and needless to say this will be reflected in the cost.

The White Plains Road Line

The portion of the White Plains Road Line that can be utilized for Second Avenue Line operation consists of approximately 22,000 feet of elevated steel structure along White Plains Road from Bronx Park East station to the terminal at 241st Street. Reference to Figure 20, Figure 21, Figure 22, and Figure 23, is made. South of Bronx Park East station the connections, stations, transfer facilities and all other new construction required to connect the Second Avenue Line to the Pelham Line for any specific proposal will be outlined in Chapter IV.

The structure was designed and built by the New York State Public Service Commission between 1913 and 1920 and then turned over to the Interborough Rapid Transit Company for revenue operations. The Structure is a three track elevated steel bent type identical in its basic configuration to the Pelham Bay Line. There are no areas where the construction differs from the typical. Between the E. 238th Street and E. 241st Street stations lead tracks are provided from the southbound direction of the main line to the adjacent NYCTA E. 239th Street Yard. The lead tracks are of elevated steel bent type construction and continue into the yard where they connect to tracks that are on grade. The NYCTA Maintenance of Way Department maintains the entire length of the elevated structure and at the present it is considered to be in good condition.

As stated in Chapter II the NYCTA Number 2 (7th Avenue Express) and Number 5 (Lexington Avenue Express) operate on the line. The rolling stock used is of the "A" Division IRT type; therefore, all the modifications described for the Pelham Line are also required for the White Plains Road Line. The work is described below in a brief manner since essentially it is the same as the Pelham Line.

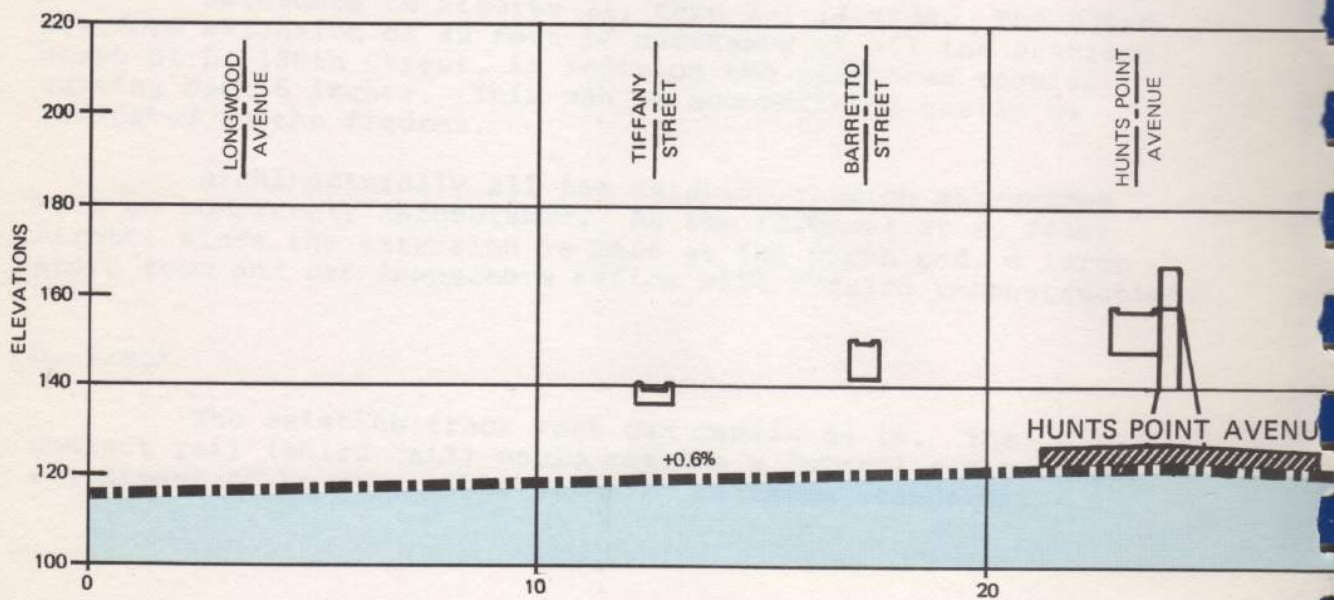
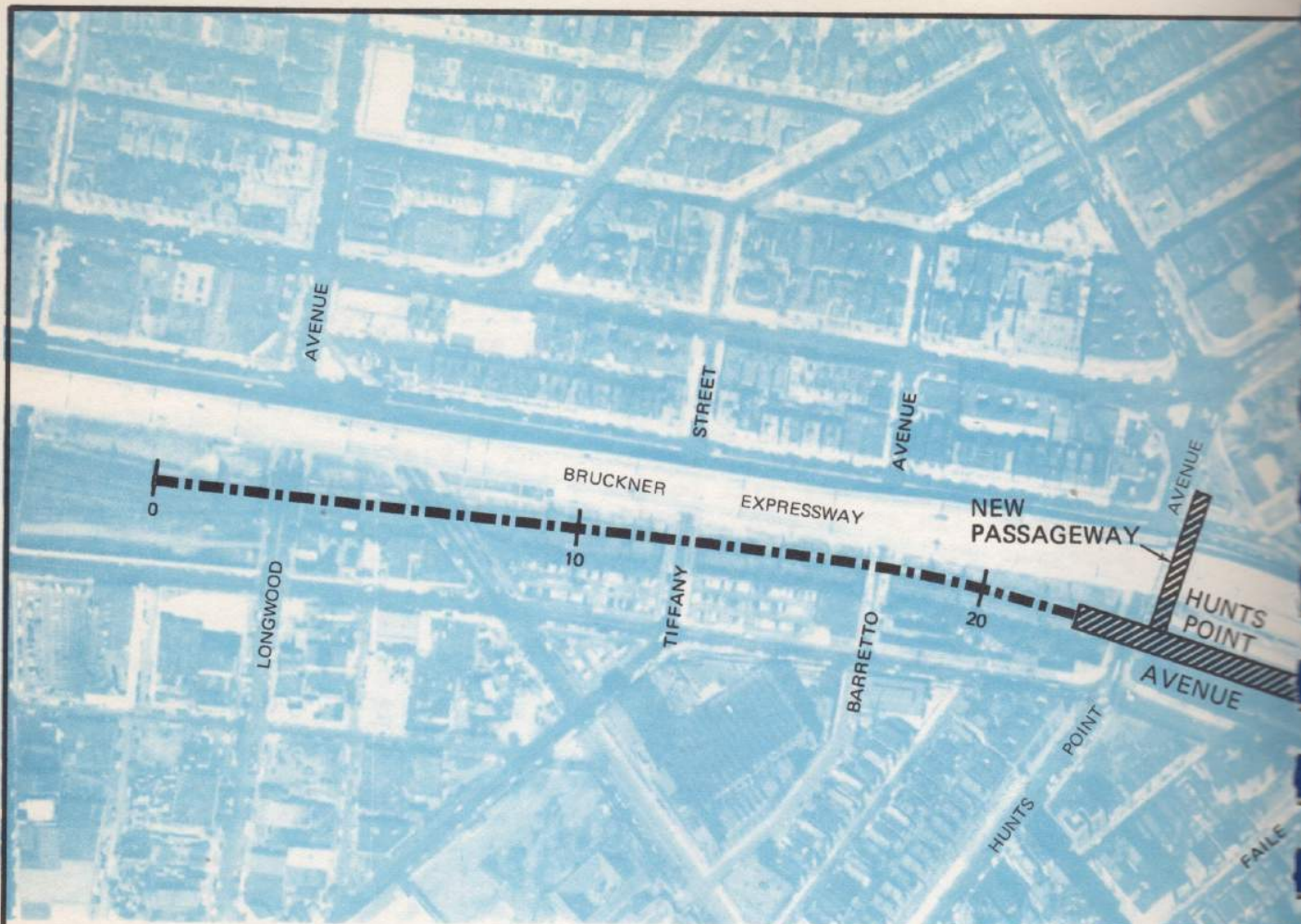
a. Structural - Architectural

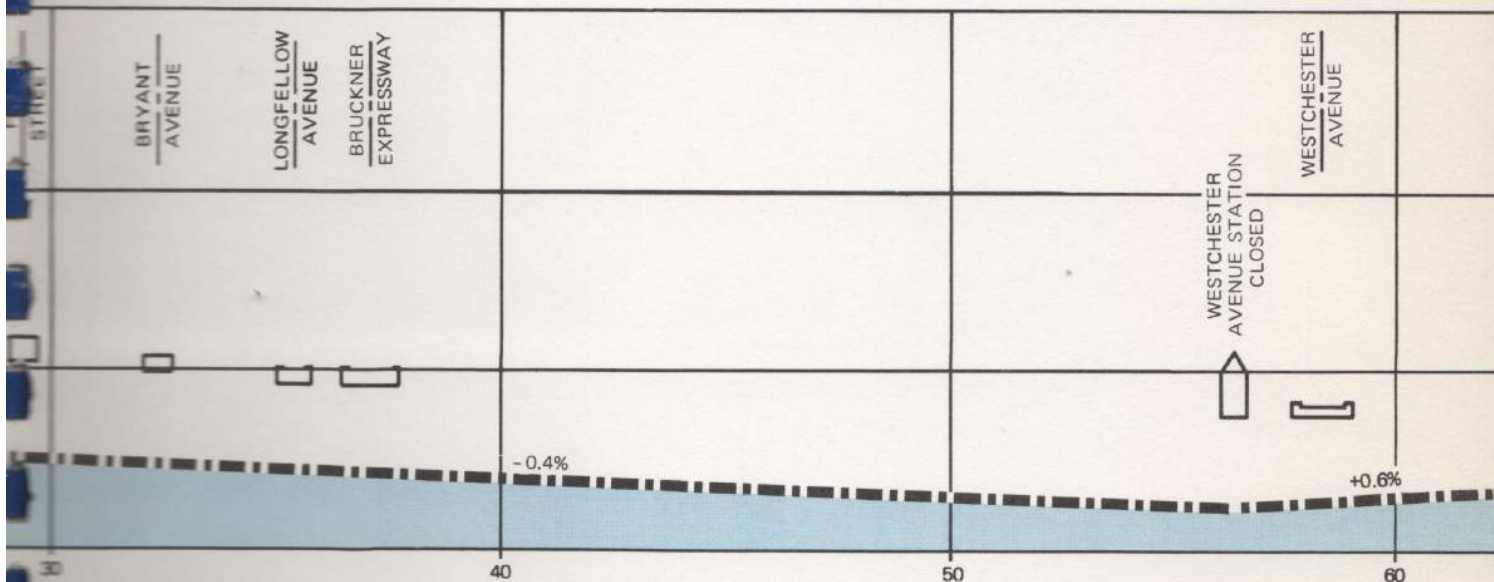
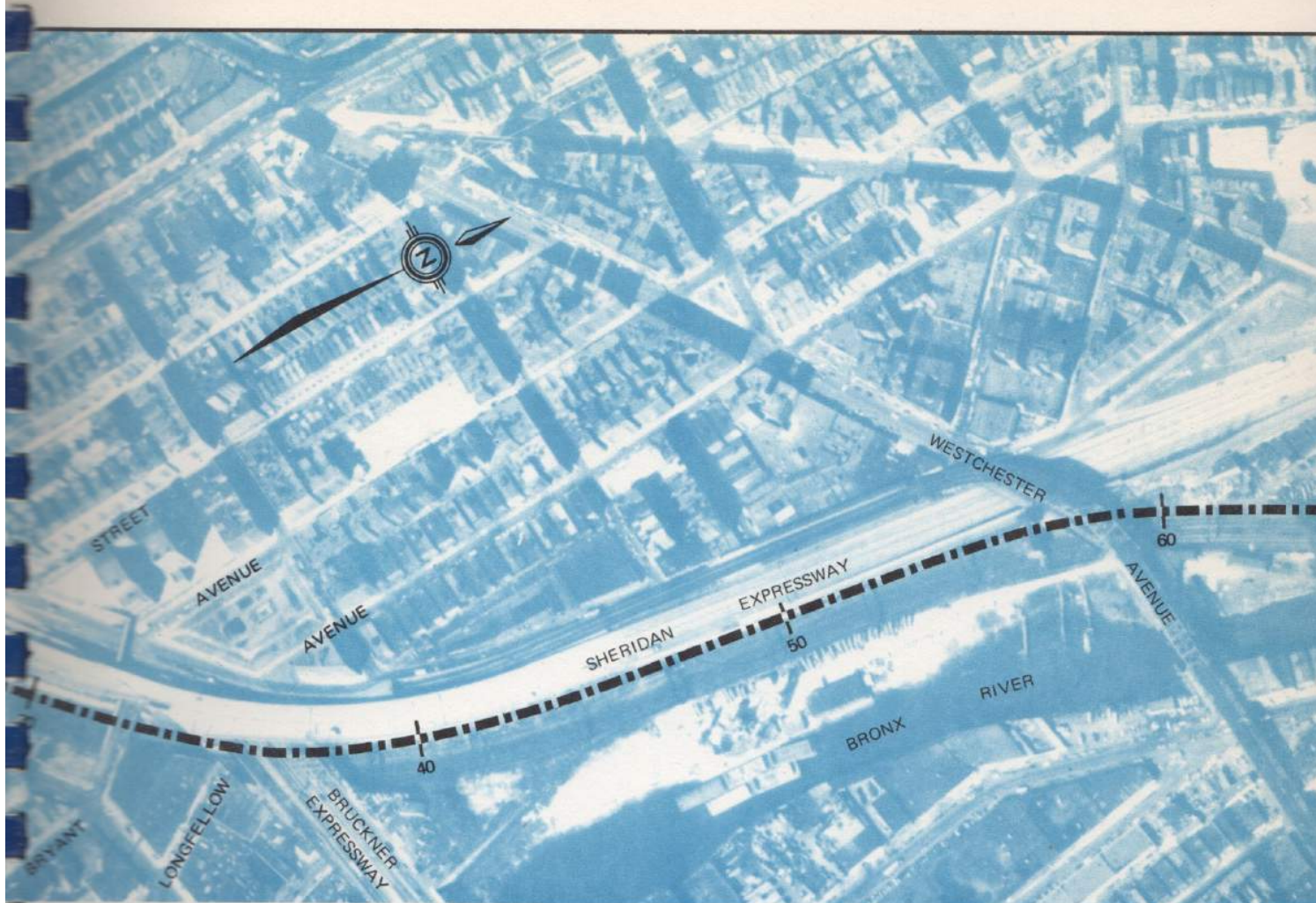
Reference to Figures 21, thru 23, is made. The basic platform extension of 90 feet is necessary at all the stations north of E. 180th Street, in addition the platforms require cutting back 6 inches. This can be accomplished easily as indicated on the figures.

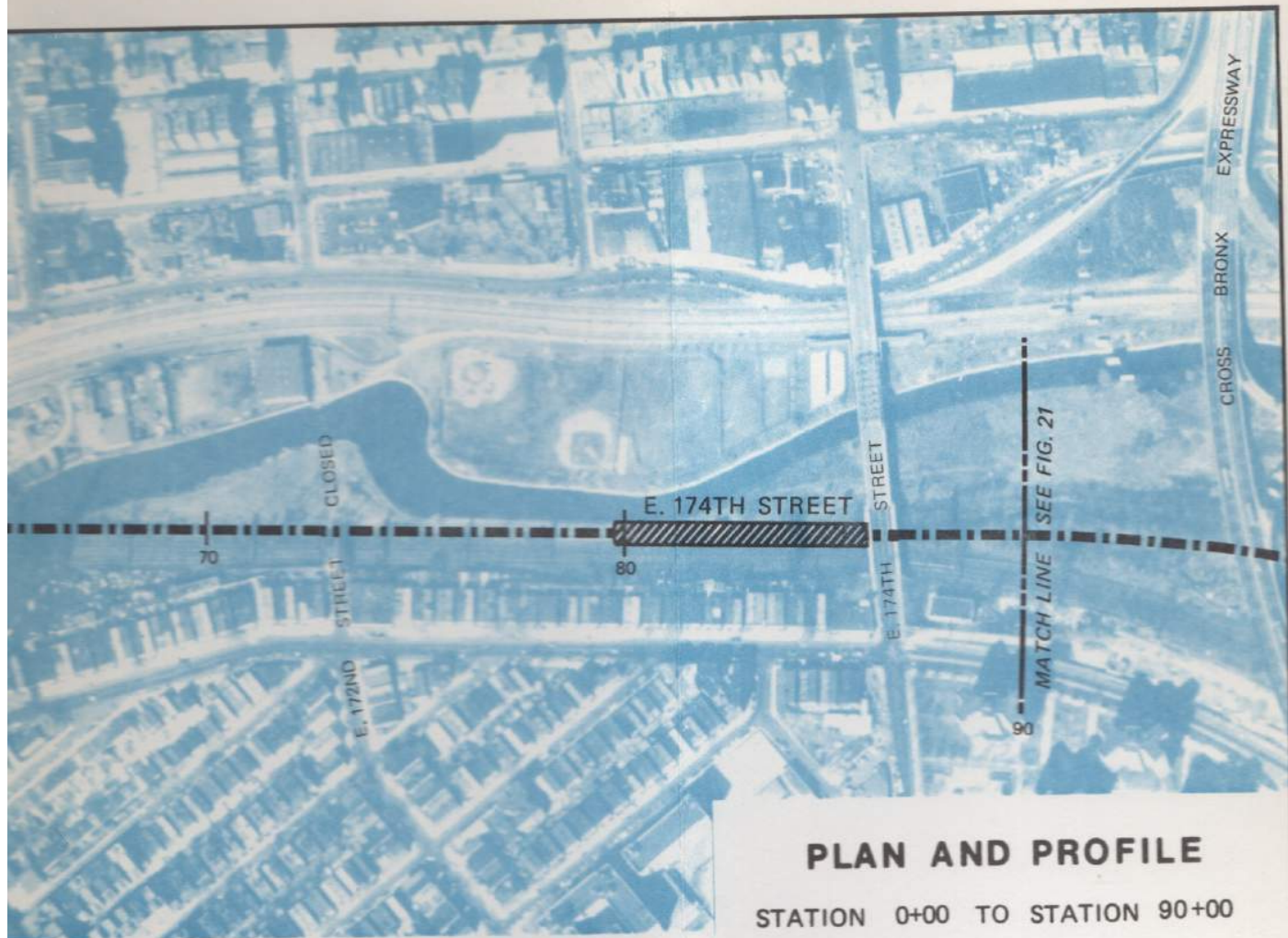
Architecturally all the existing station mezzanines will be completely refurbished. At the terminal at E. 241st Street, since the extension is made at the north end, a large store room and car inspectors office will require reconstruction.

b. Track

The existing track work can remain as is. The contact rail (third rail) would require a lateral and vertical adjustment to be compatible with "B" Division standards.

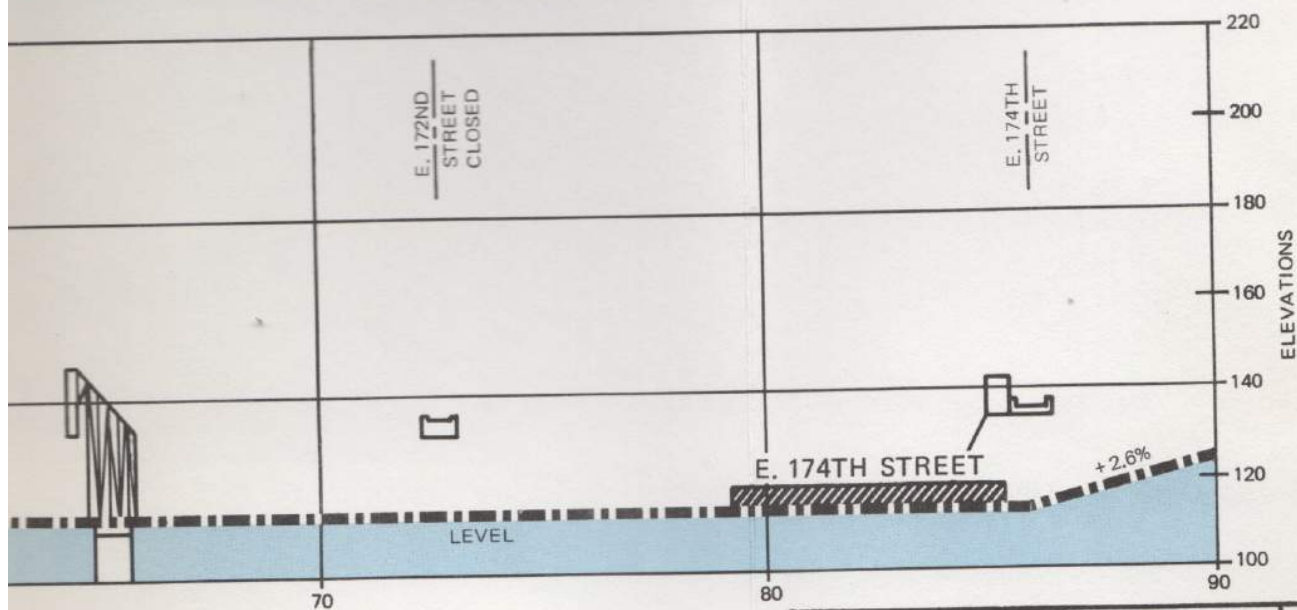






PLAN AND PROFILE

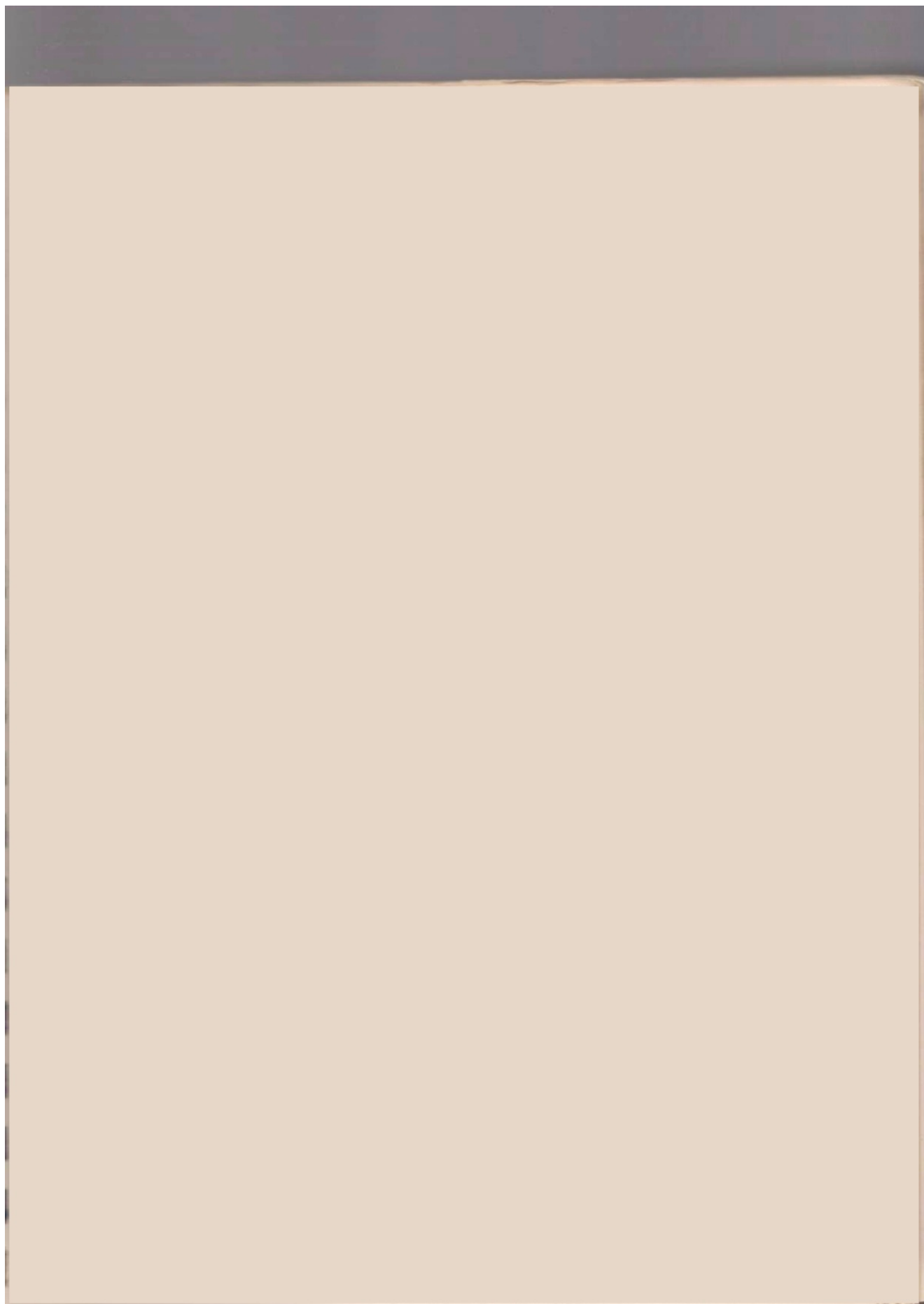
STATION 0+00 TO STATION 90+00

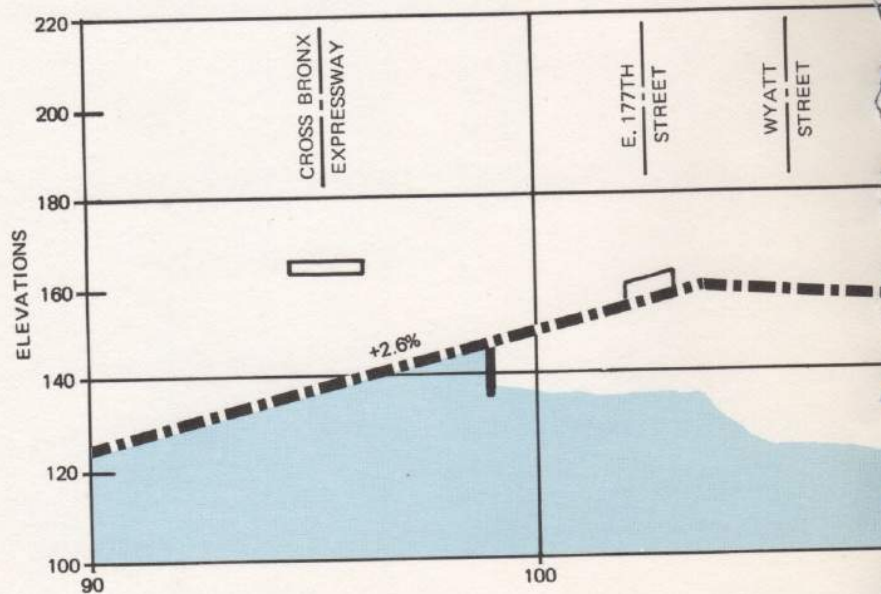
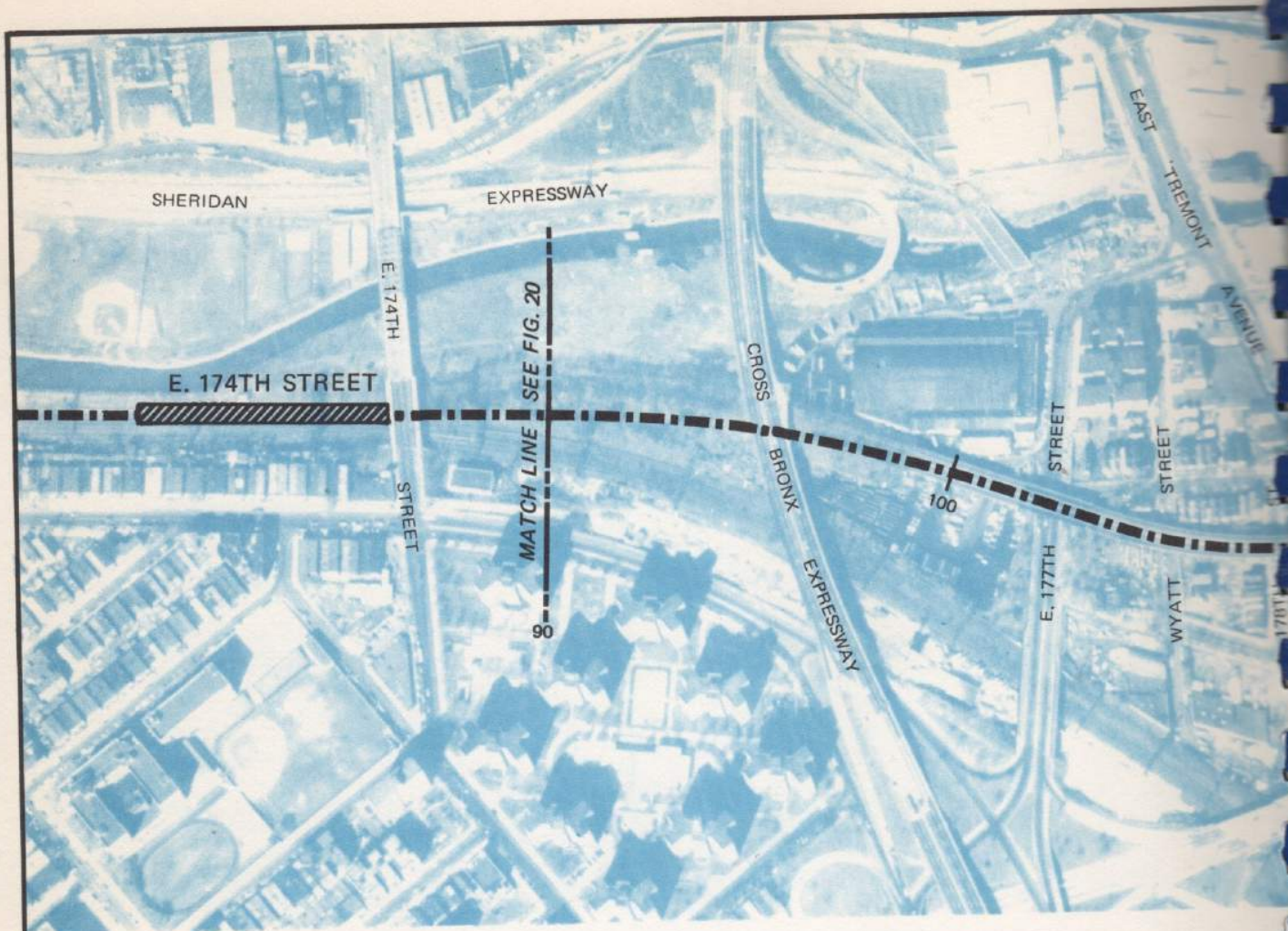


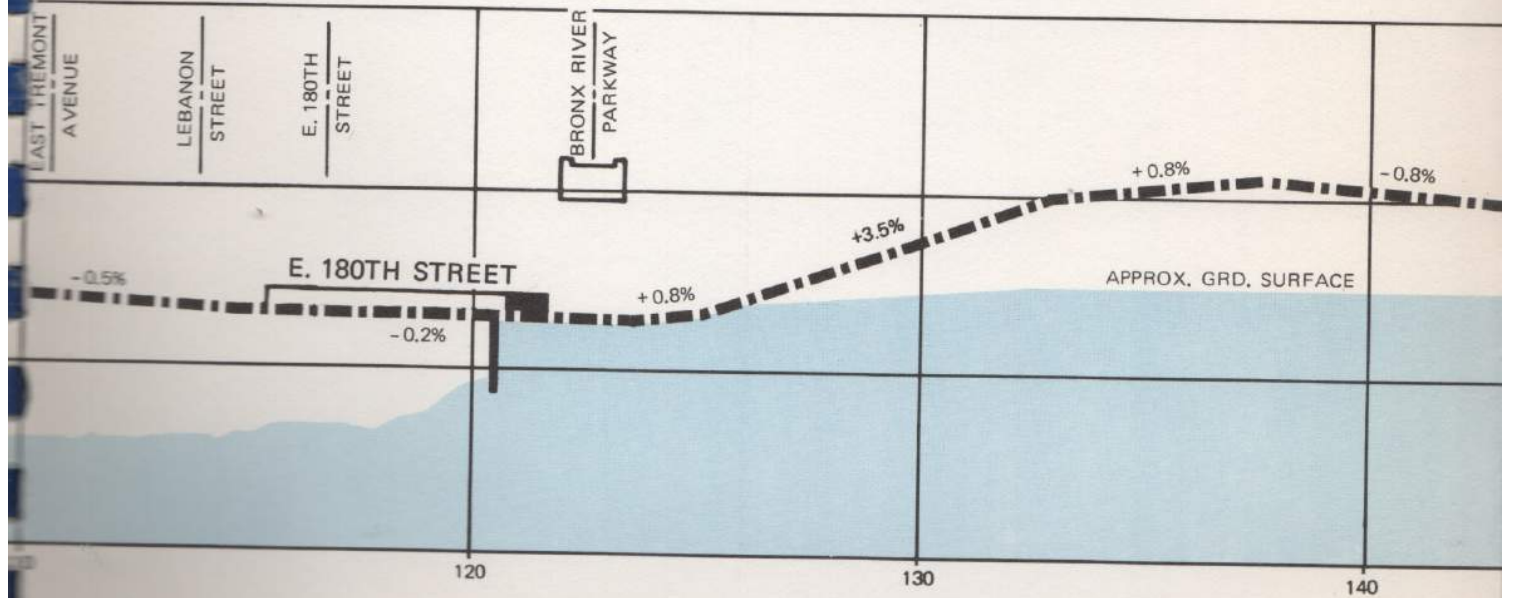
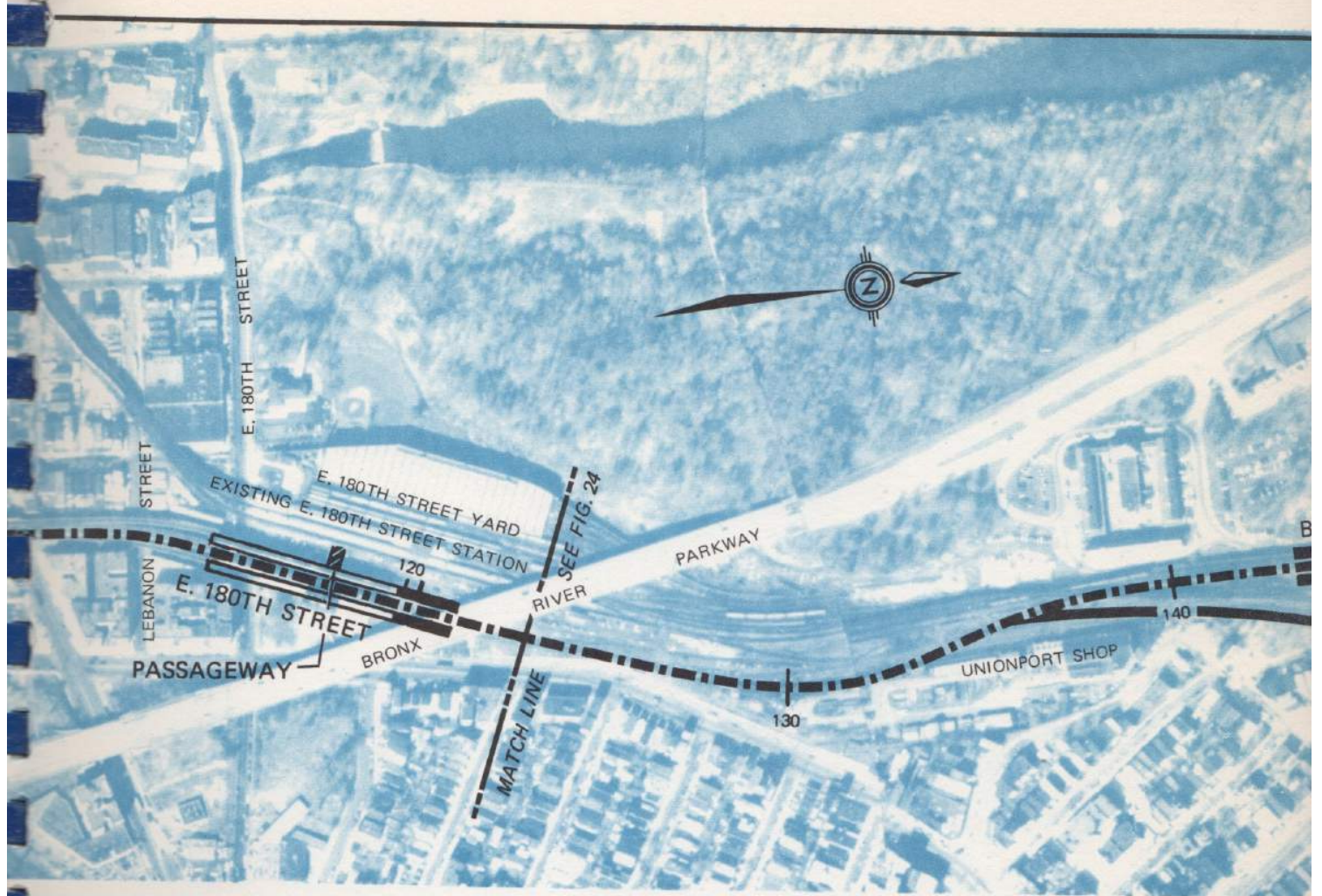
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
WHITE PLAINS ROAD
CORRIDOR
LONGWOOD AVE TO
E 174TH STREET

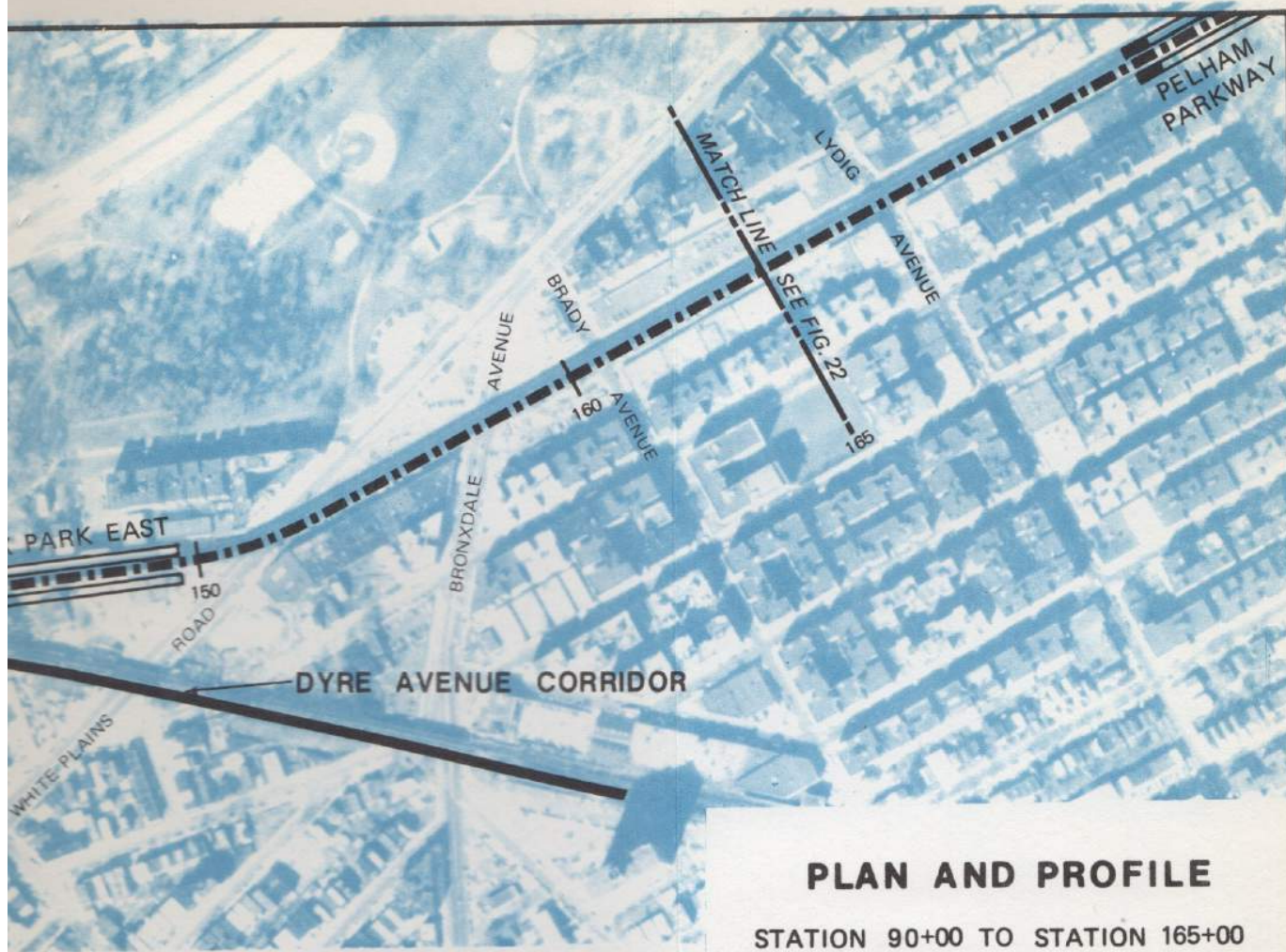
TS C-230

20



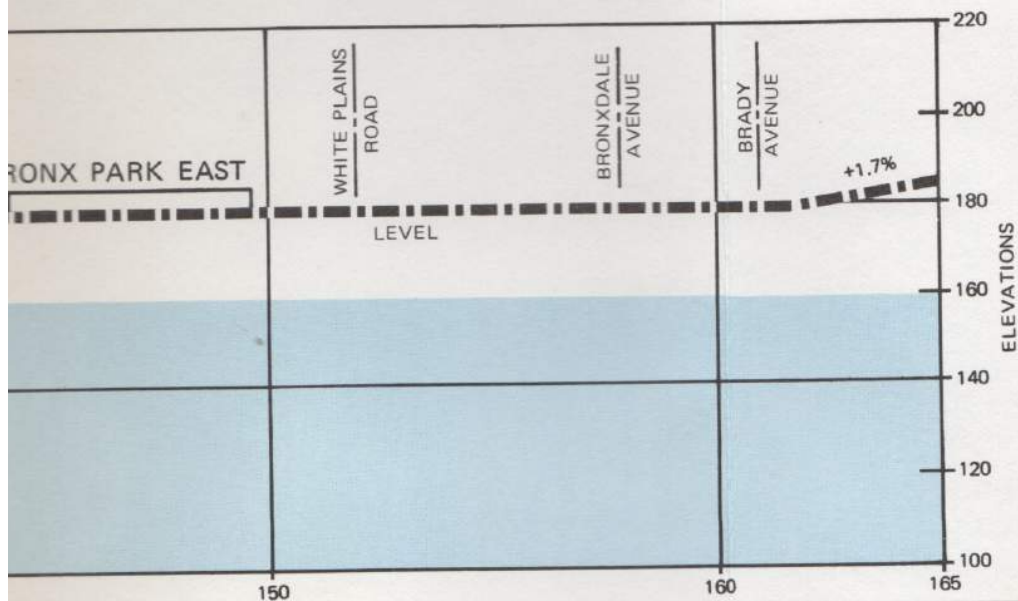






PLAN AND PROFILE

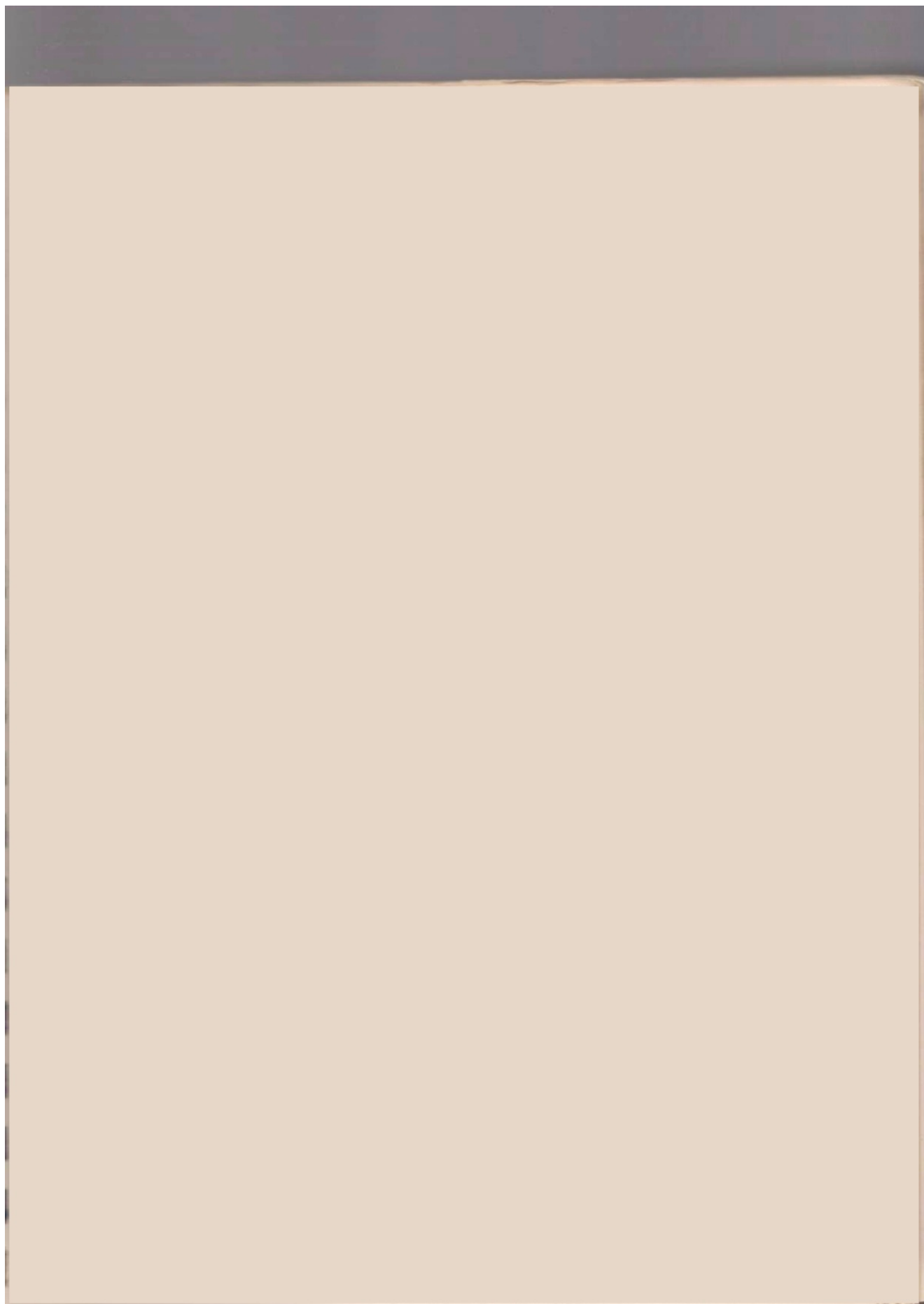
STATION 90+00 TO STATION 165+00

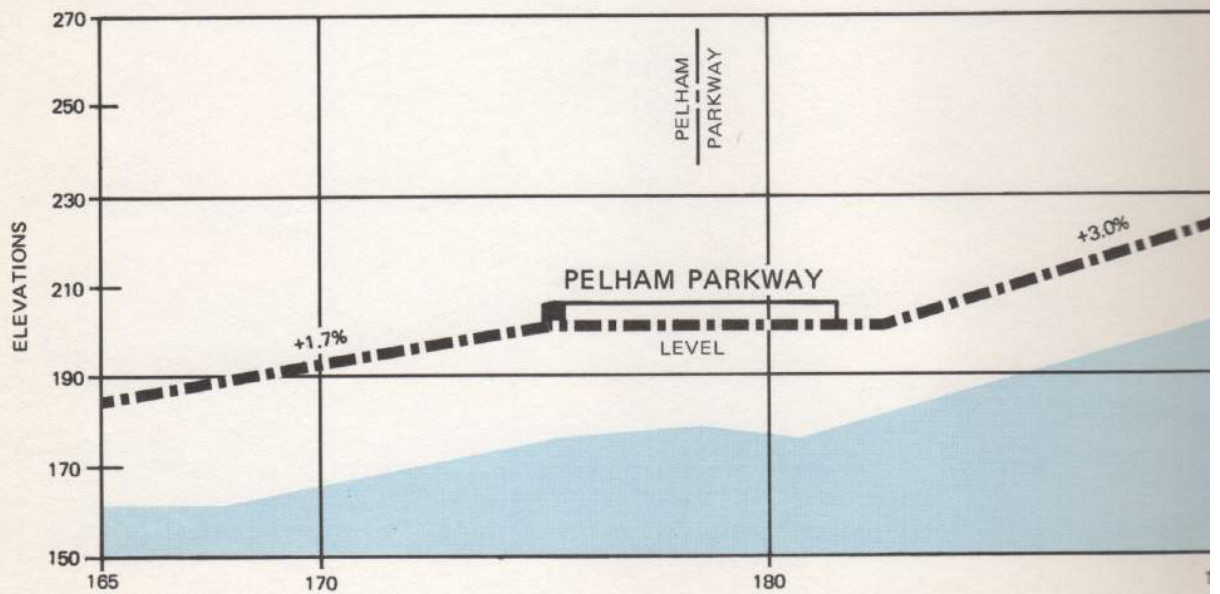
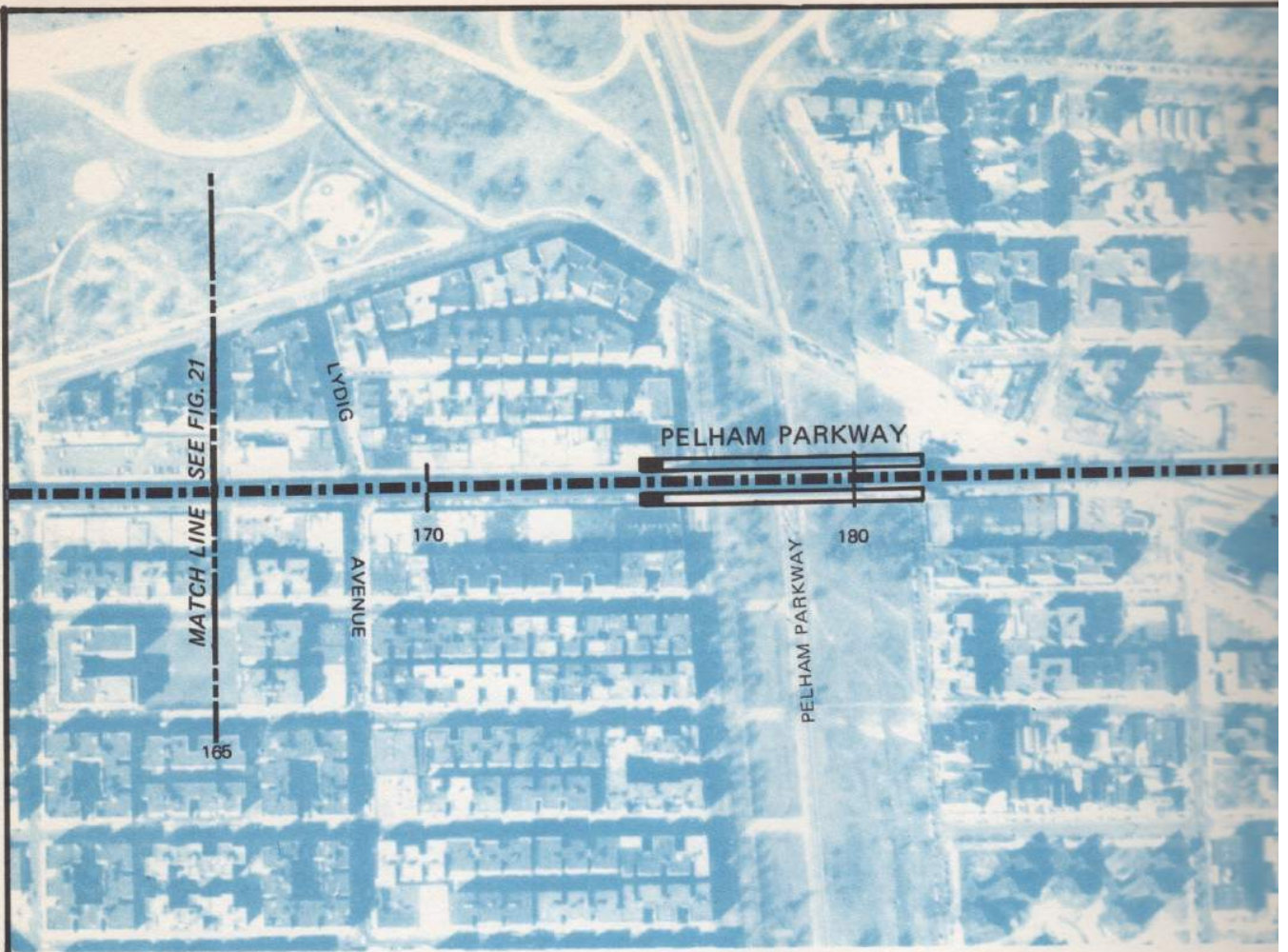


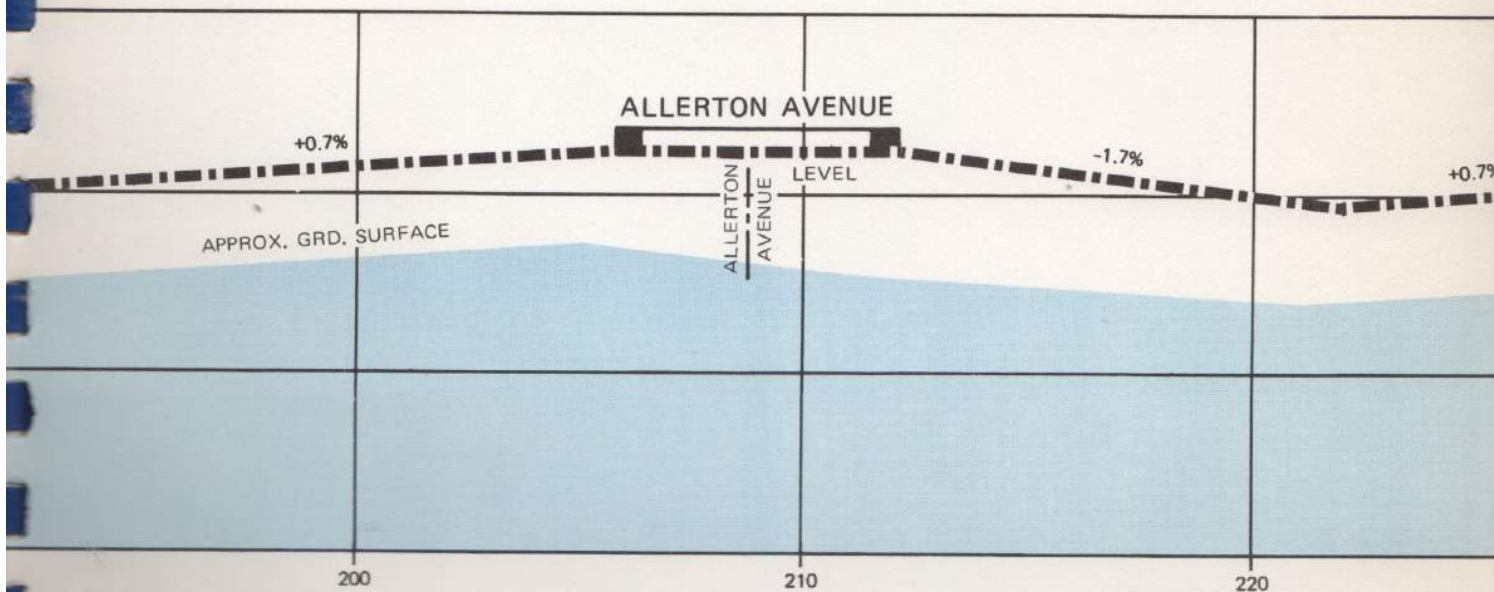
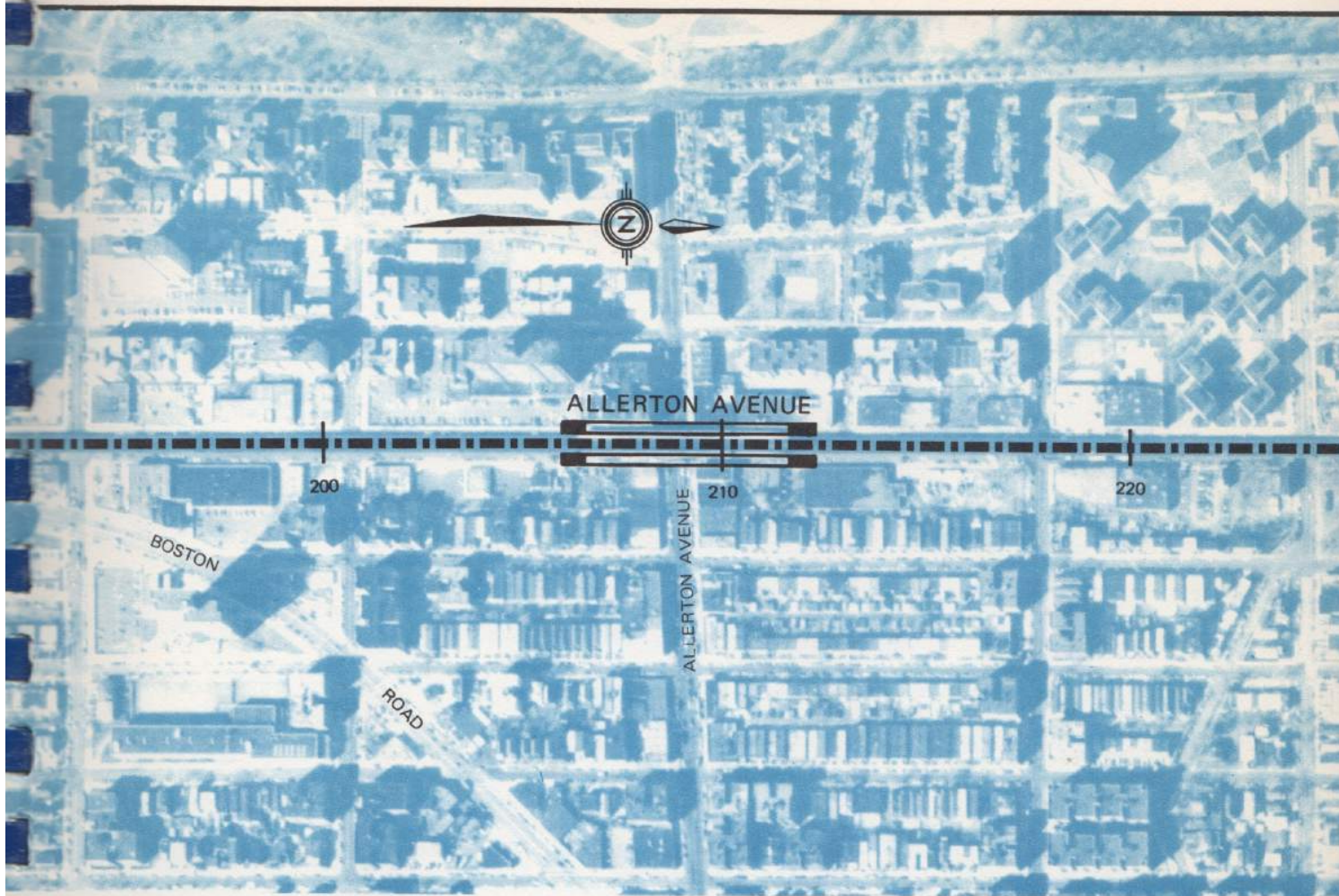
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
WHITE PLAINS ROAD
CORRIDOR
E 174TH STREET TO
LYDIG AVENUE

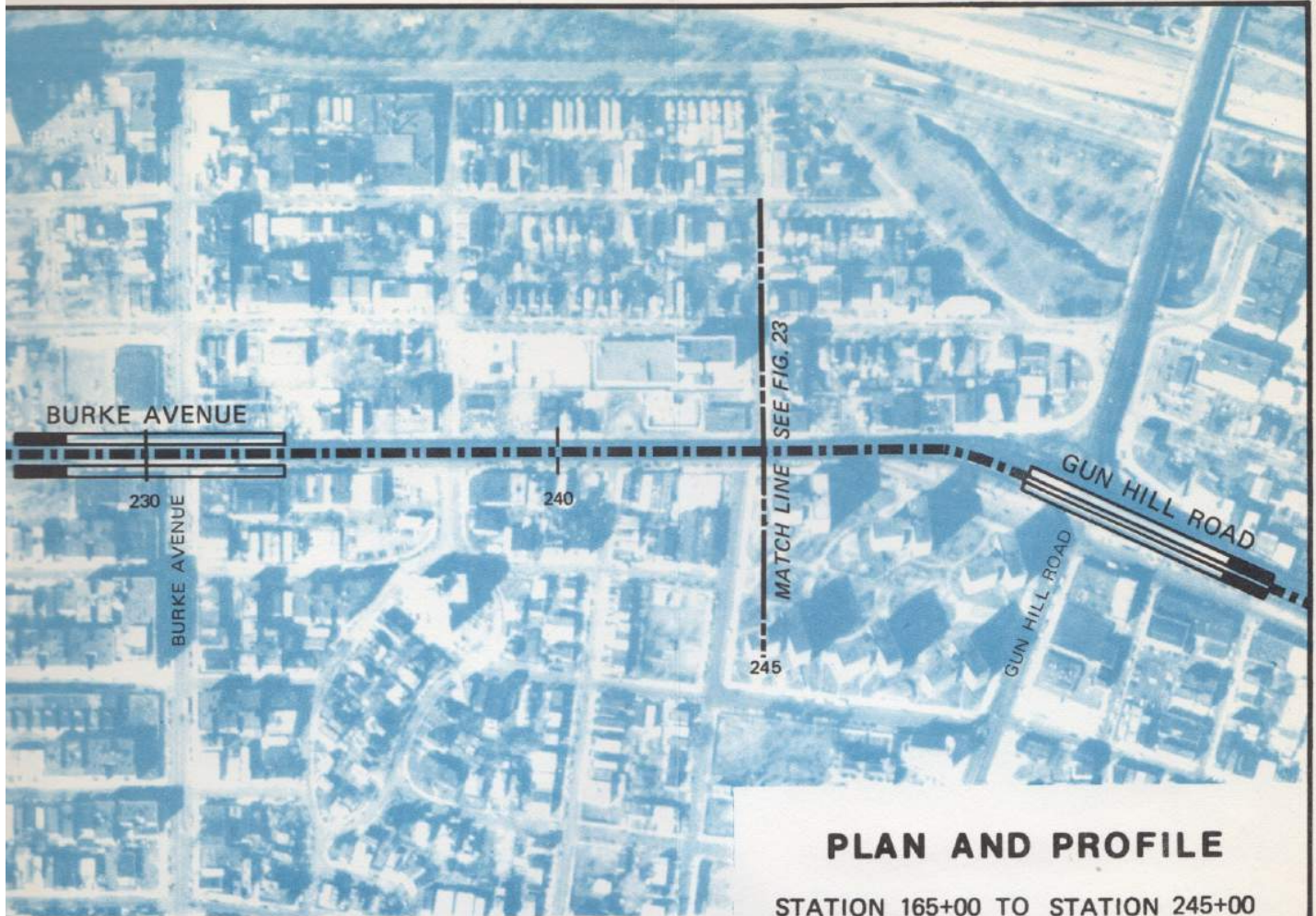
TS C-230

21



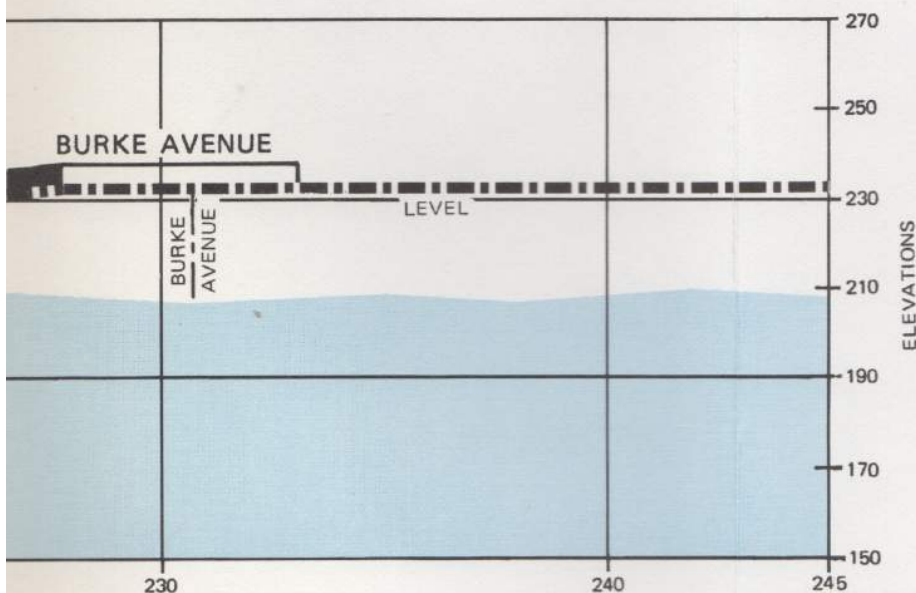






PLAN AND PROFILE

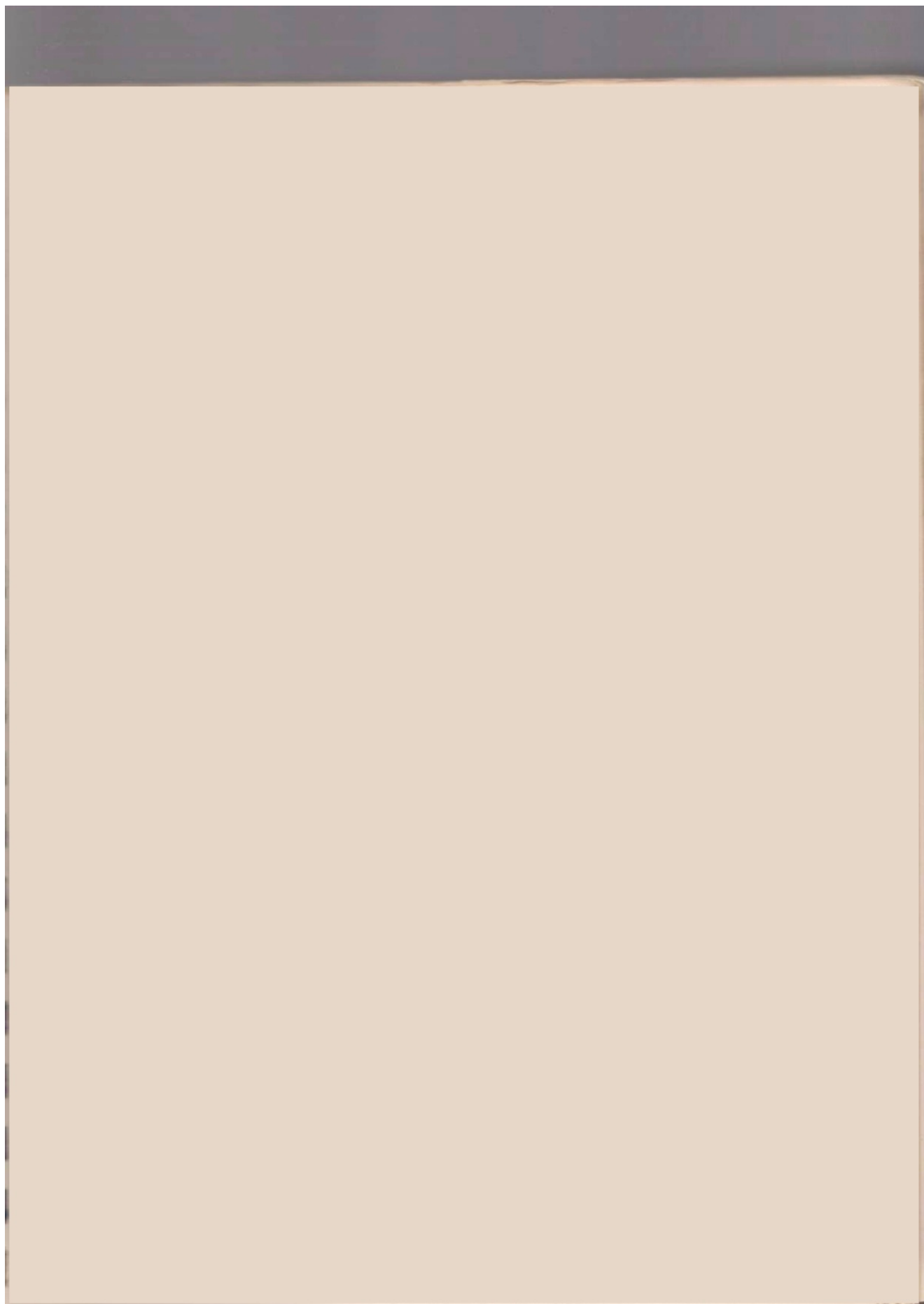
STATION 165+00 TO STATION 245+00

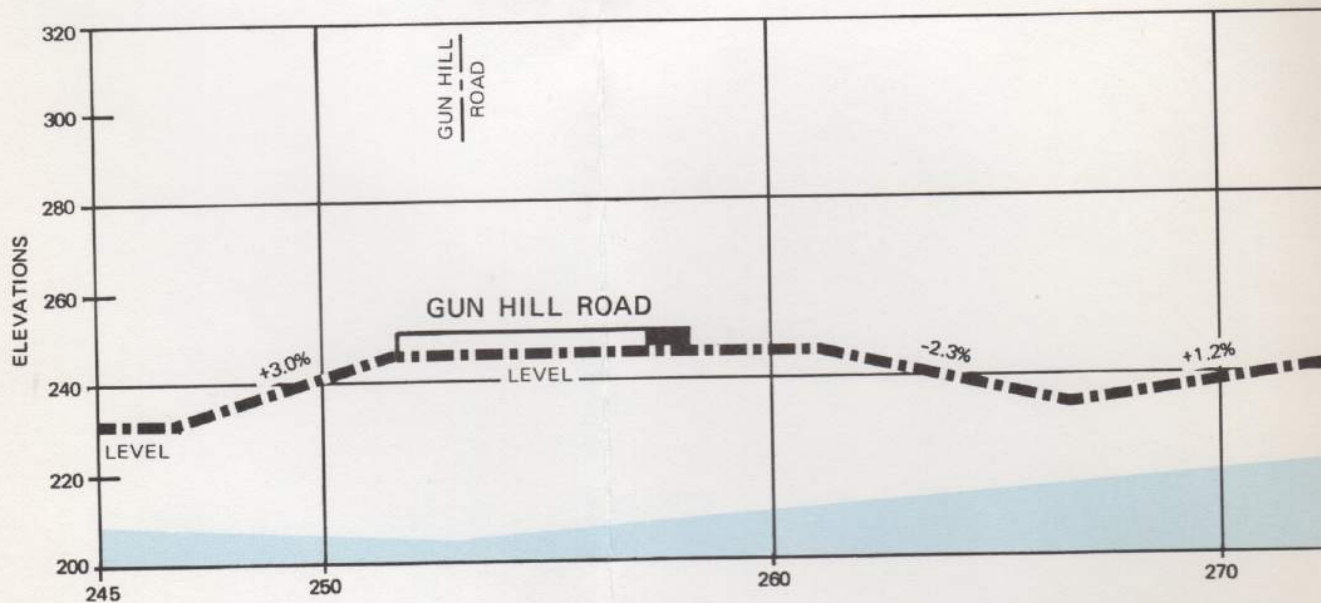
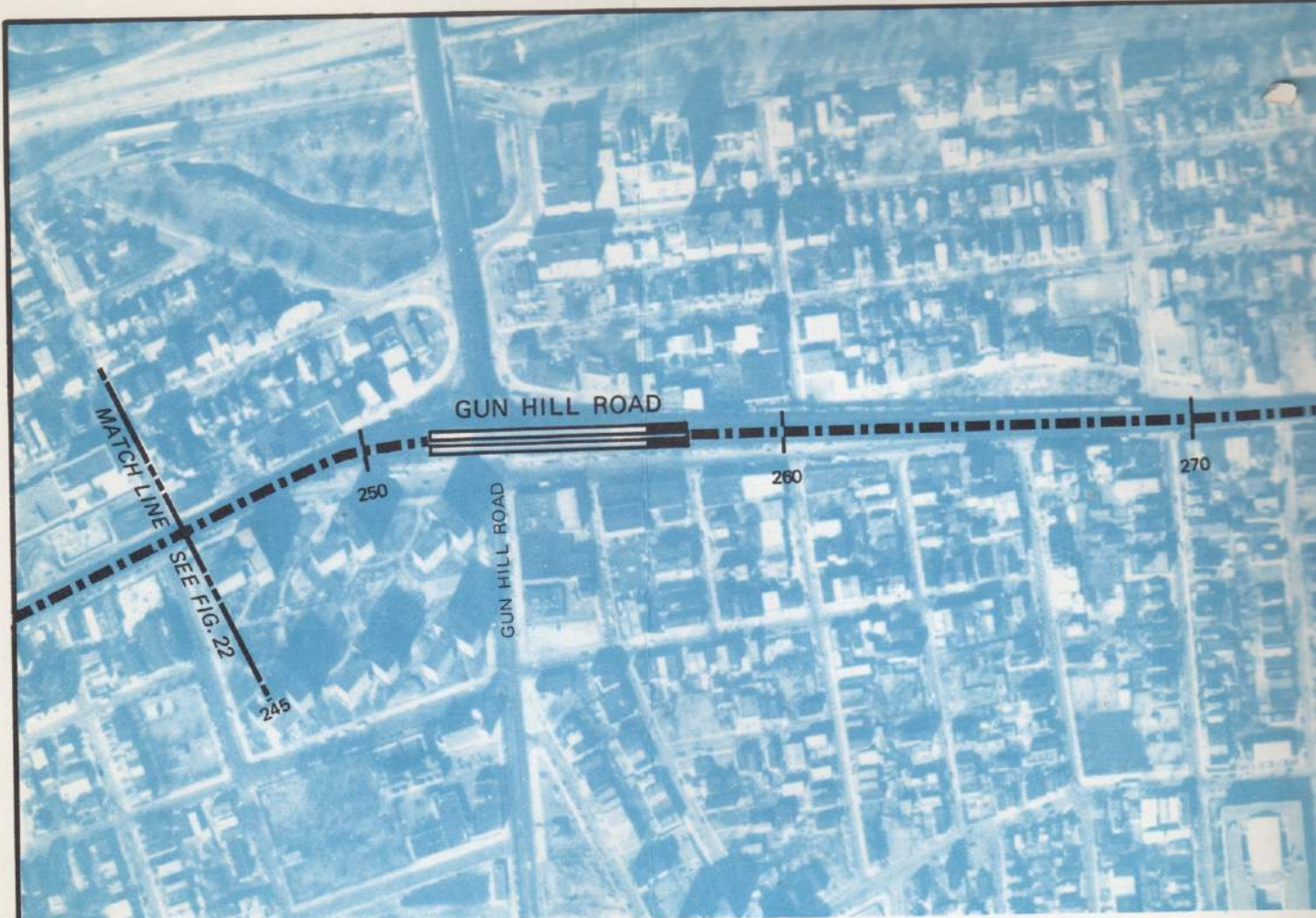


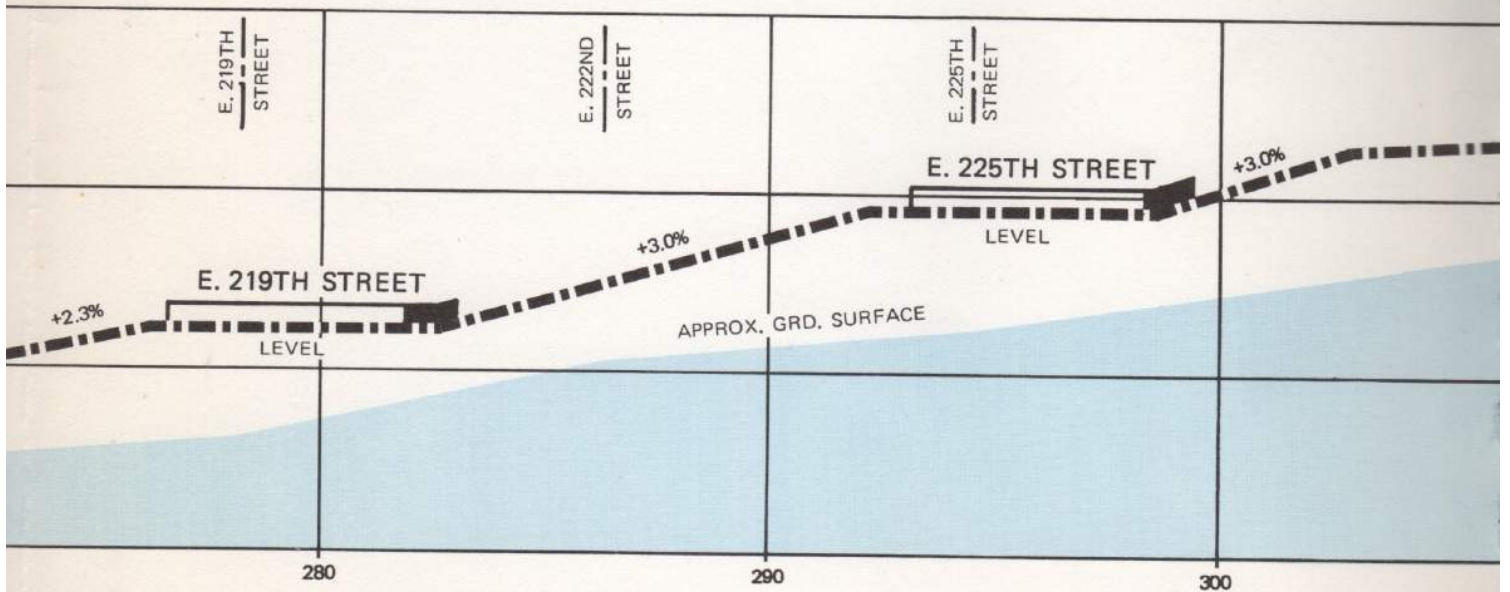
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
WHITE PLAINS ROAD
CORRIDOR
LYDIG AVENUE TO
GUN HILL ROAD

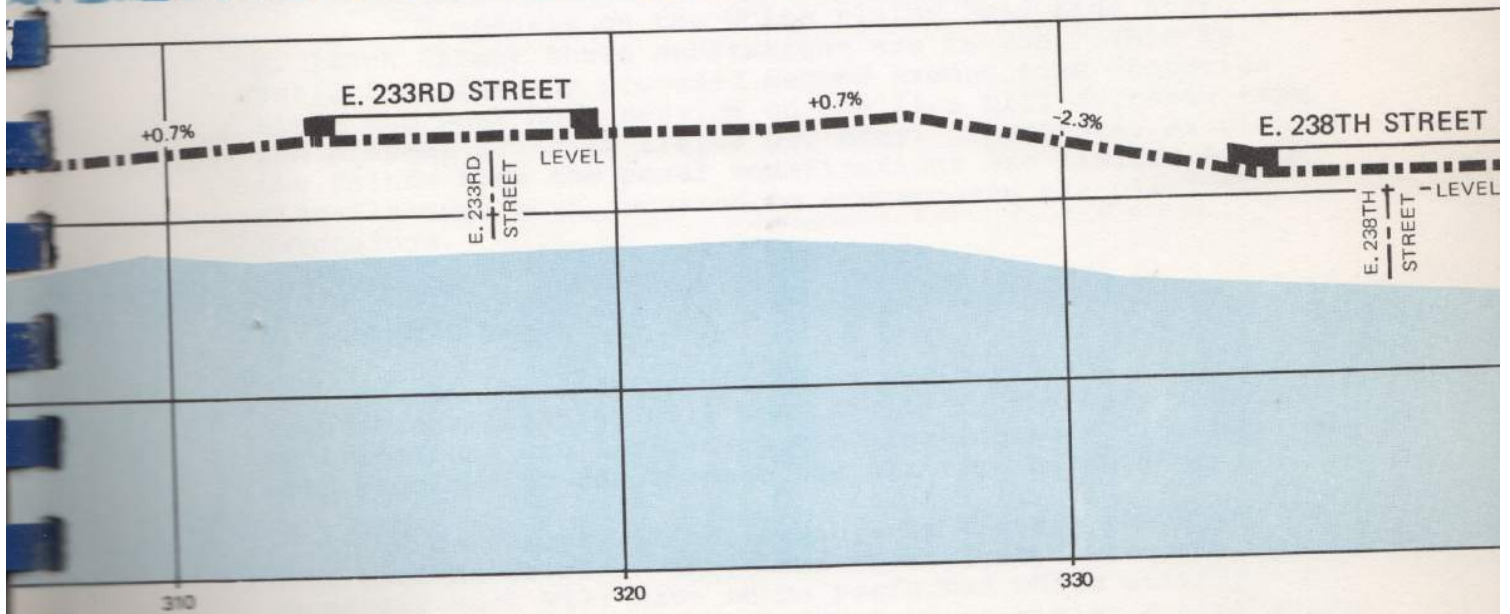
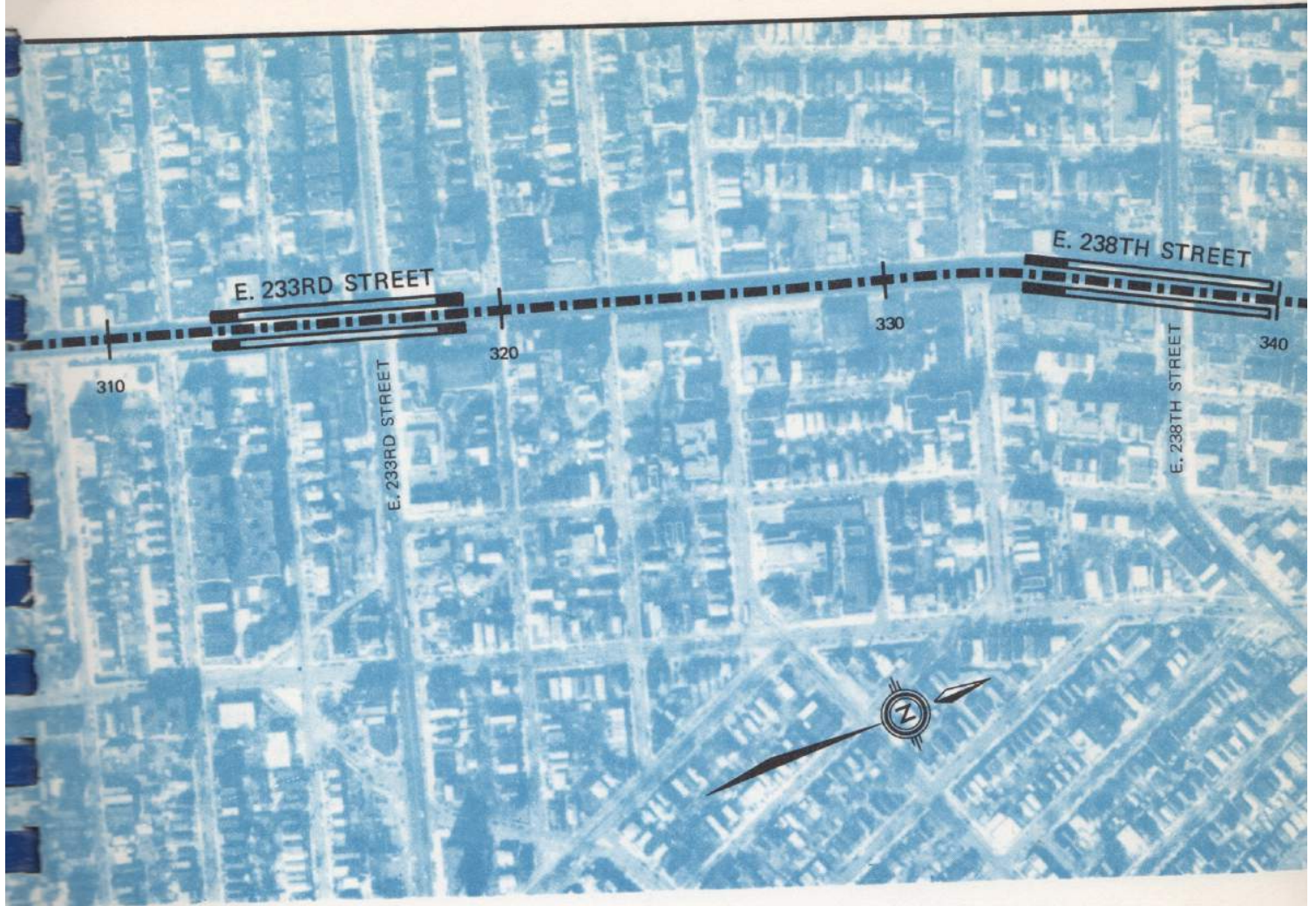
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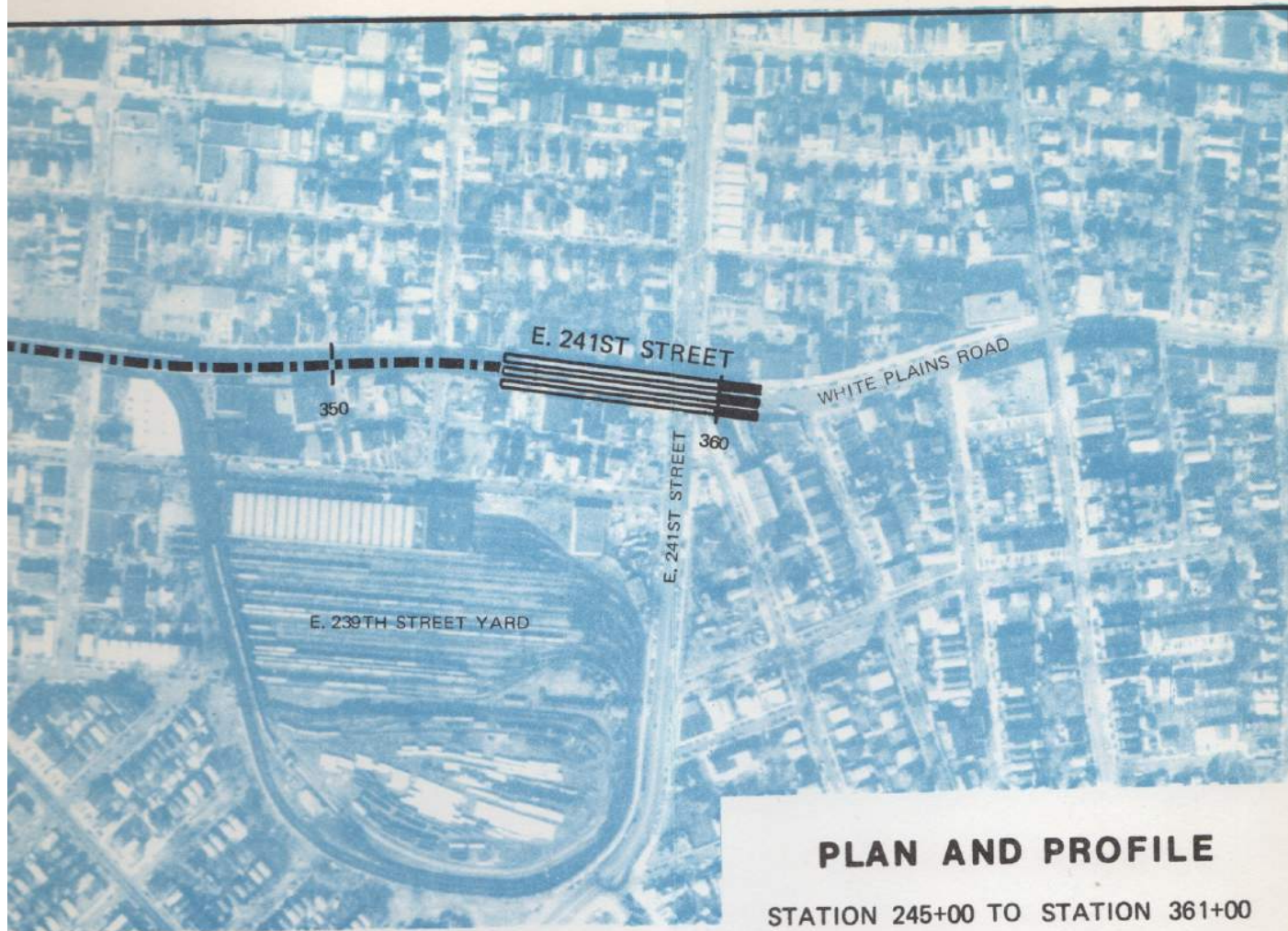
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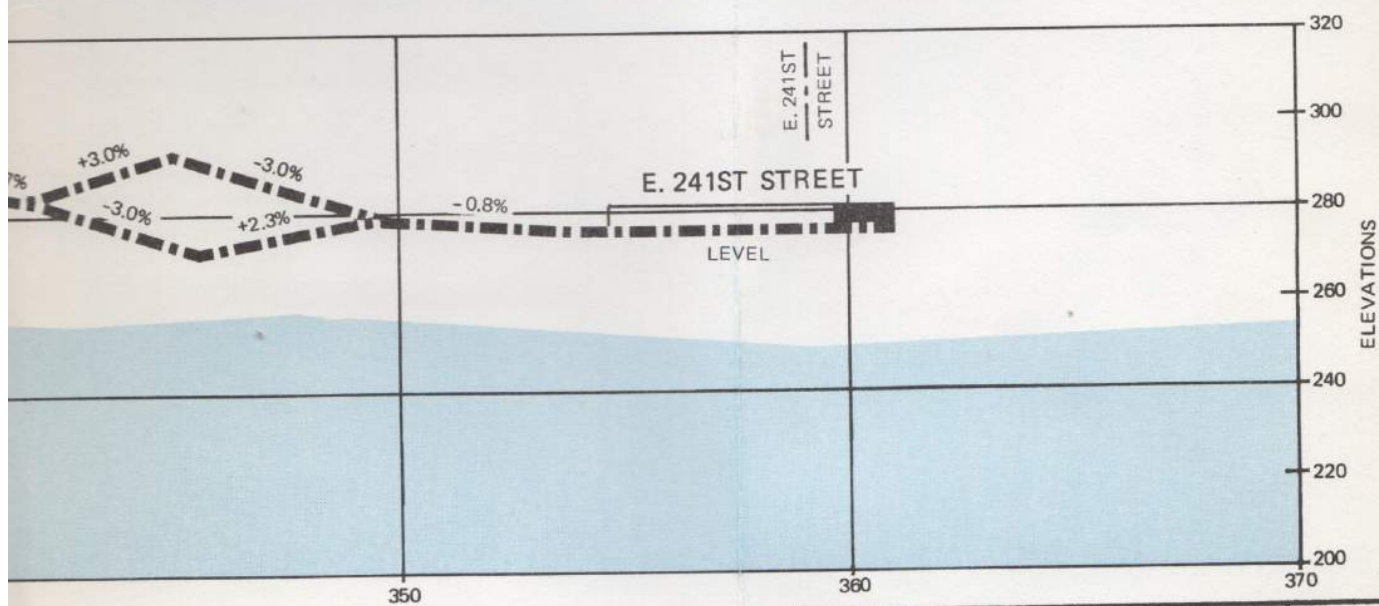






PLAN AND PROFILE

STATION 245+00 TO STATION 361+00



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
WHITE PLAINS ROAD
CORRIDOR
GUN HILL ROAD TO
241ST STREET

TS C-230

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At the E. 238th Street station on both the north-bound and southbound tracks, the superelevation will require removal at the south end of the station to accommodate the platform extensions. This will not significantly effect any operations on the line.

c. Signals

The existing wayside signal system on the two outside local tracks will require removal and replacement with a cab signaling system. The middle express track from E. 180th Street to Gun Hill Road will remain as is and be utilized for storage of IRT trains operating south of E. 180th Street. North of Gun Hill Road the express track can be cab signaled and used for layup of Second Avenue Line trains.

In addition the existing wayside signal system will require modification to accommodate the platform extensions and for a period of time both wayside and cab systems will be in place until conversion to Second Avenue Line operations takes place.

d. Power

Presently on the White Plains Road Line north of E. 180th Street three substations are in use. This is sufficient for any proposed Second Avenue Line operation since the peak hour service on the line will decrease from the present 22 to 15 trains per hour. Therefore, as with the Pelham Line the power modifications are limited to the miscellaneous work required to accommodate the platform extensions.

e. Line Equipment

At the station platforms and mezzanine areas new fluorescent lighting will be installed. The only additional modifications are limited to the miscellaneous line equipment work required to accommodate the platform extensions.

In summary it is feasible to convert the White Plains Road Line to Second Avenue Line operations. However, the necessary work will have to be performed while existing operations on the line are maintained requiring a high degree of coordination which in turn results in high costs.

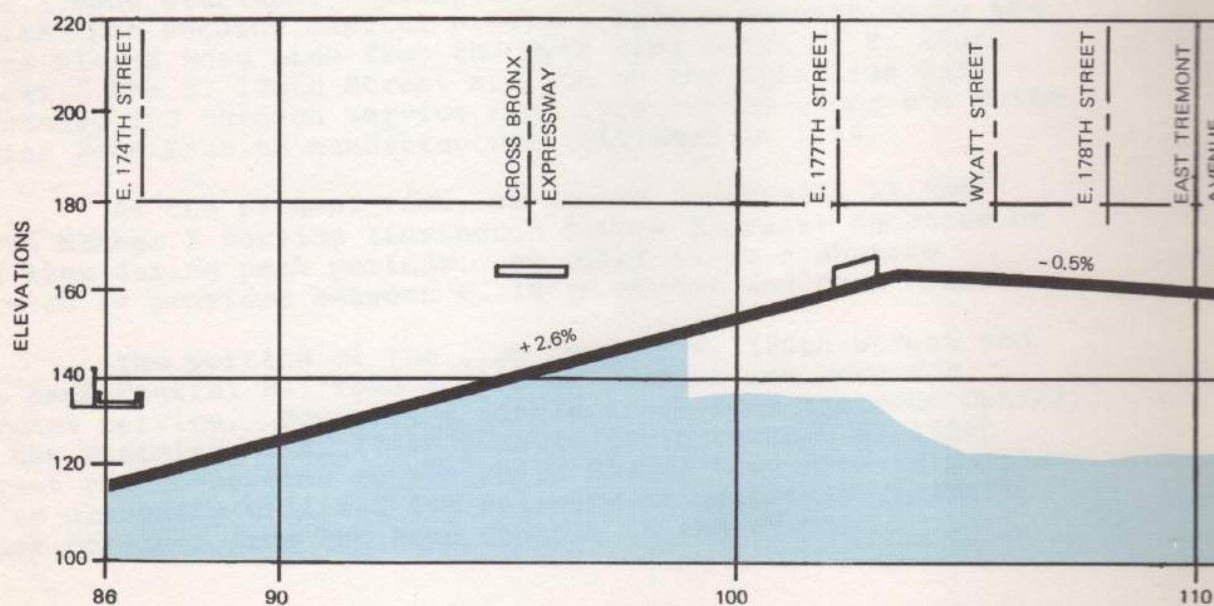
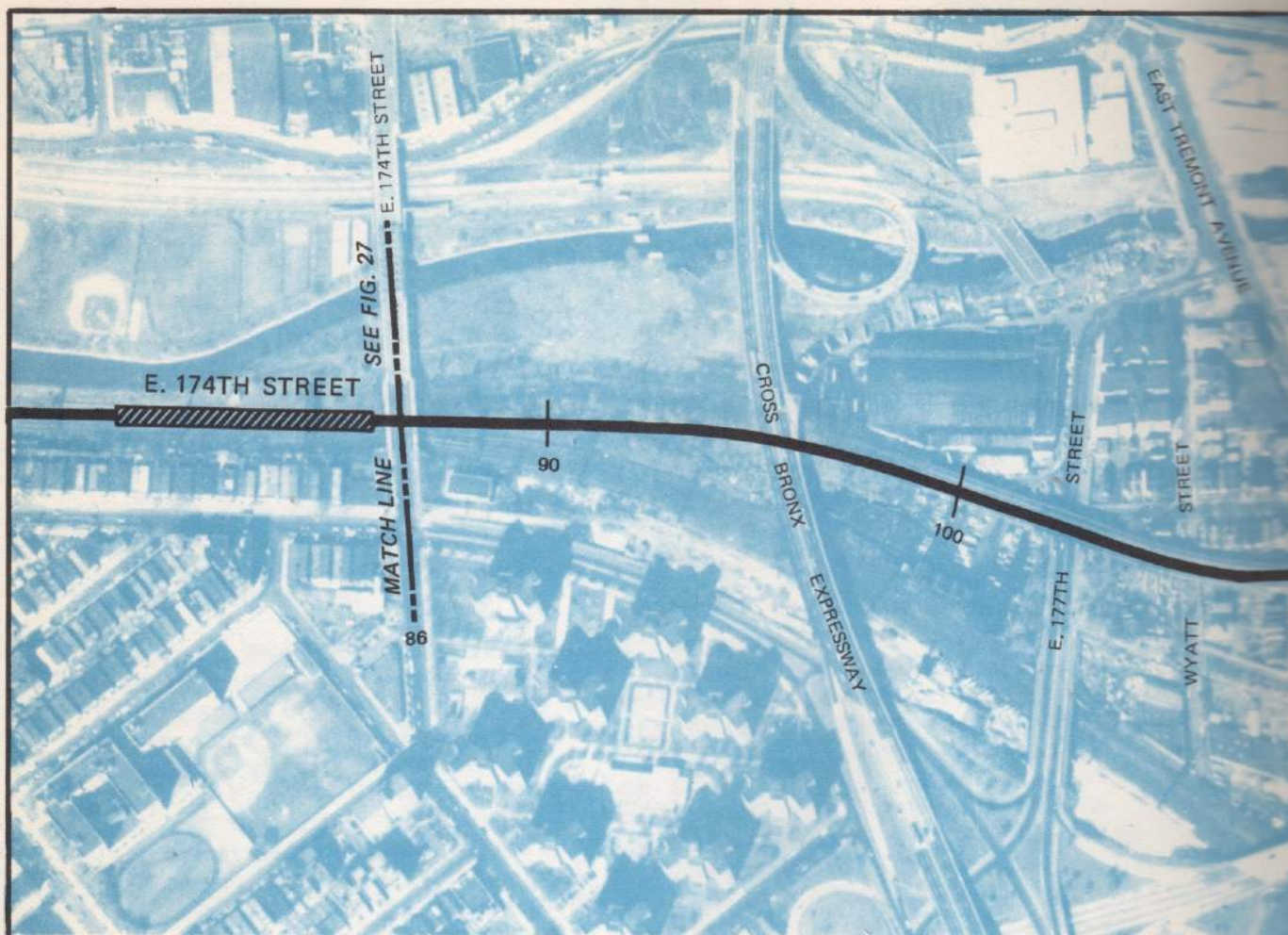
The Dyre Avenue Corridor

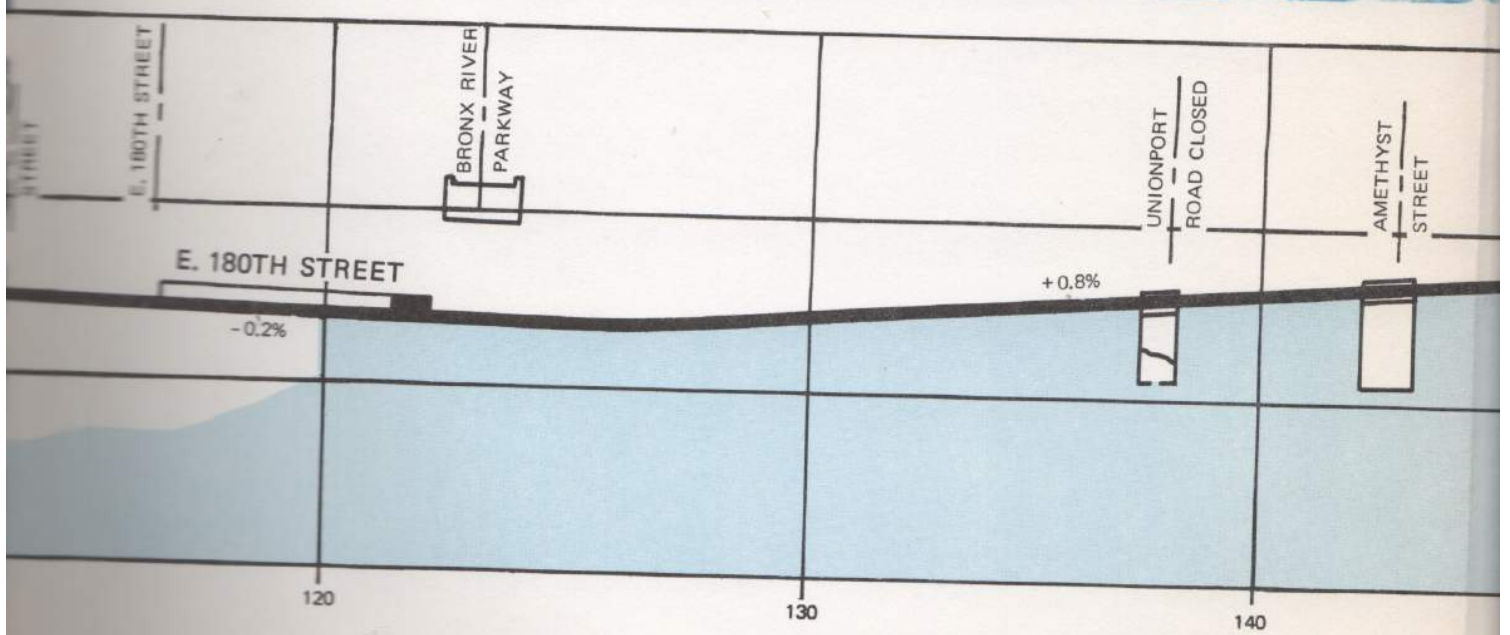
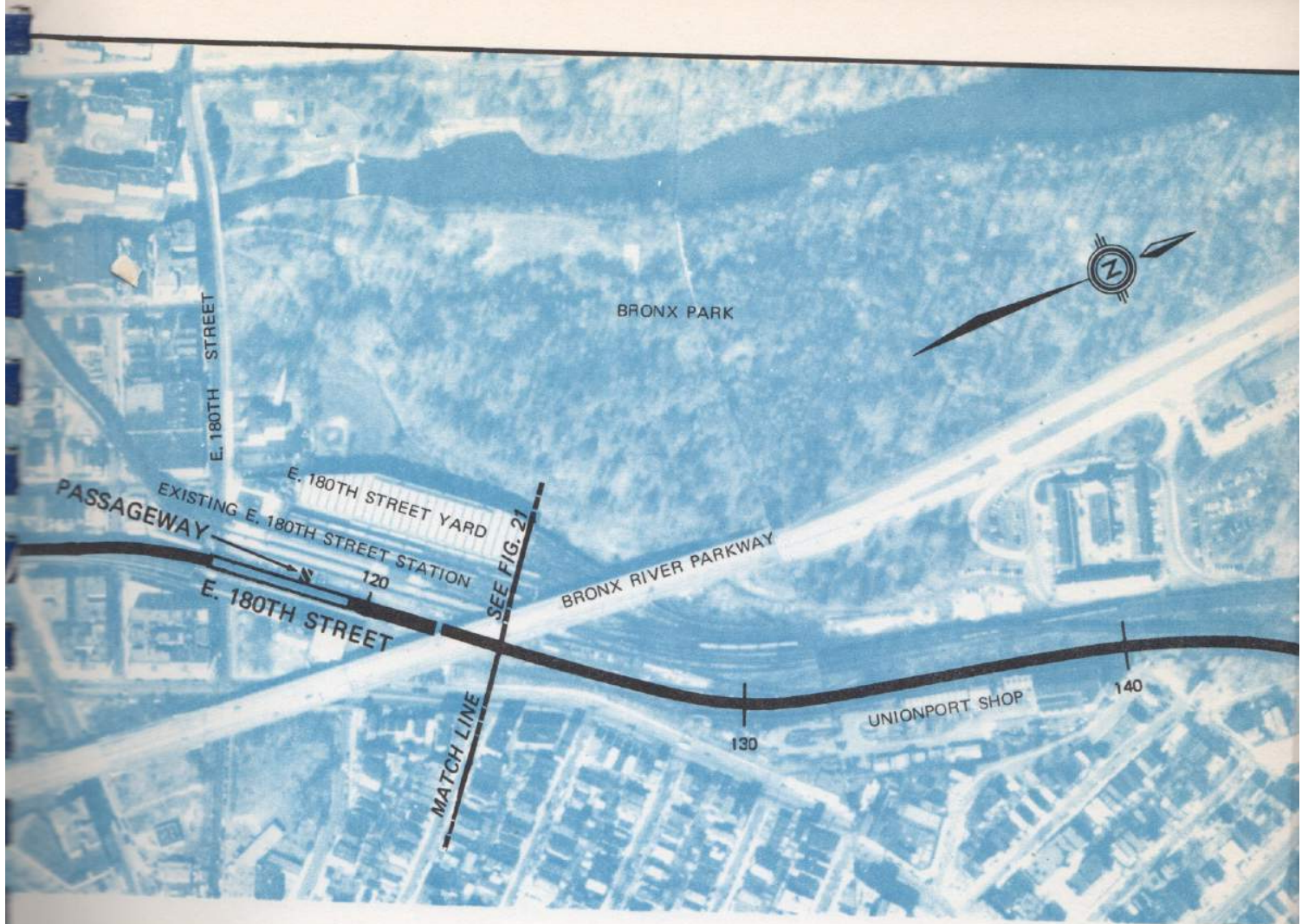
The Dyre corridor that can be utilized for Second Avenue Line operations consists of approximately 25,600 feet of combined elevated, tunnel, embankment and open cut structure from the intersection of E. 172nd Street and the Penn Central ROW to Dyre Avenue and 233rd Street, the present terminal of the NYCTA Dyre Avenue Line. Reference to Figure 24, Figure 25, and Figure 26 is made. At E. 174th and 180th Streets the connections, stations, transfer facilities and all other new construction that may be required to extend the Second Avenue Line to Dyre Avenue for any specific proposal will be outlined in Chapter IV.

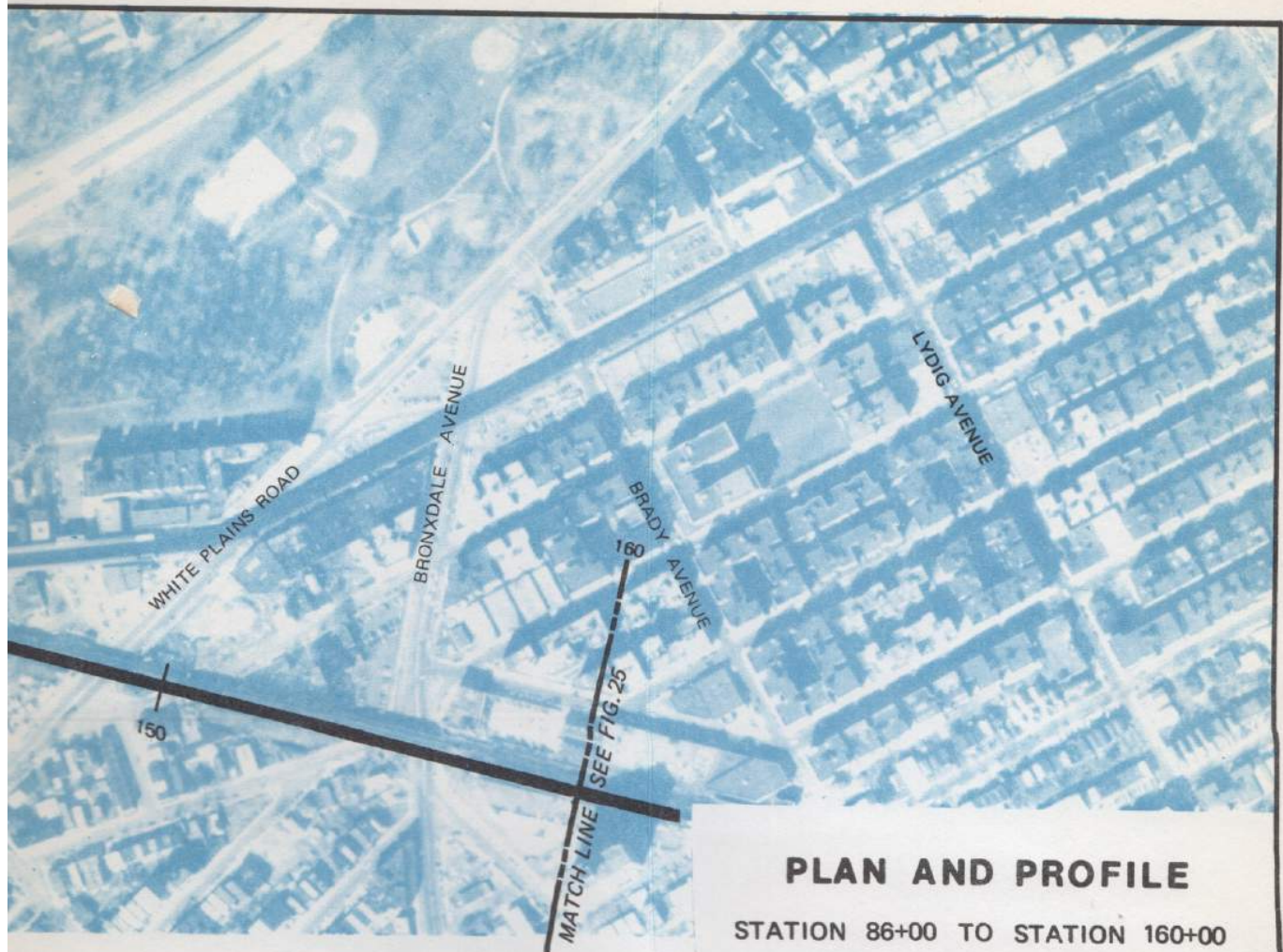
The line was originally the property of the New York Boston and Westchester Railroad. It was constructed between 1909 and 1912 at which time a commuter railroad service operated on it from White Plains and New Rochelle in Westchester to a terminal which was located at the present site of the Penn Central Harlem River yards in the south Bronx. In 1940 the City of New York acquired the portion of the line within its limits from the then bankrupt New York, Boston and Westchester Railroad, and on May 15, 1941 the Board of Transportation (predecessor of the present NYCTA) initiated a shuttle service using the two local tracks between the E. 180th Street and Dyre Avenue stations. During 1954 and 1955 the NYCTA, as part of its then ongoing capital program, made a connection to the White Plains Road Line from the Dyre Line north of E. 180th Street. The E. 180th Street station on the Dyre Line was abandoned and through service from Dyre Avenue along the White Plains Road Line to Manhattan was initiated in 1956.

At the present time, as stated in Chapter II the NYCTA Number 5 service (Lexington Avenue Express) operates on the line during peak periods. At other times a shuttle service is provided between E. 180th Street and Dyre Avenue.

The portion of the line between E. 180th Street and the Penn Central Railroad ROW is at present not used for revenue service. However, a single track from the Penn Central, in the vicinity of E. 174th Street, north through E. 180th Street and connecting to the White Plains Road Line is in place. It is presently utilized for delivery of materials (primarily track ballast) from the Penn Central to the NYCTA.

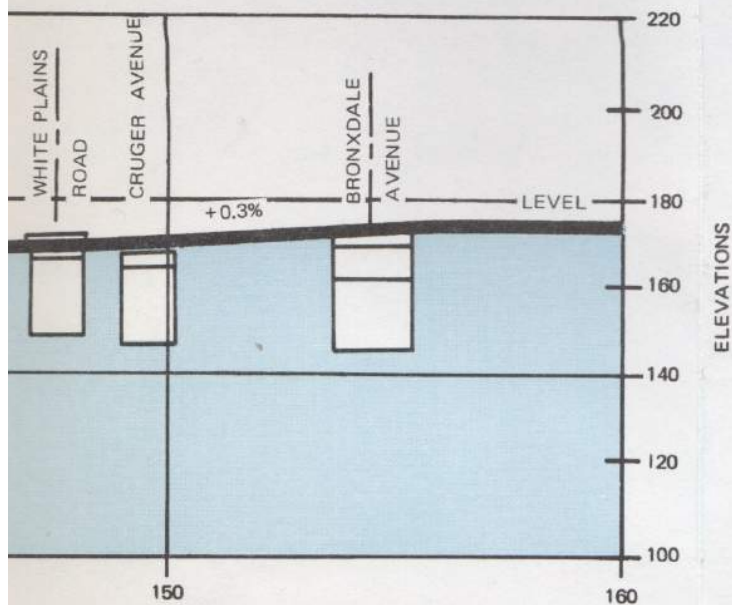






PLAN AND PROFILE

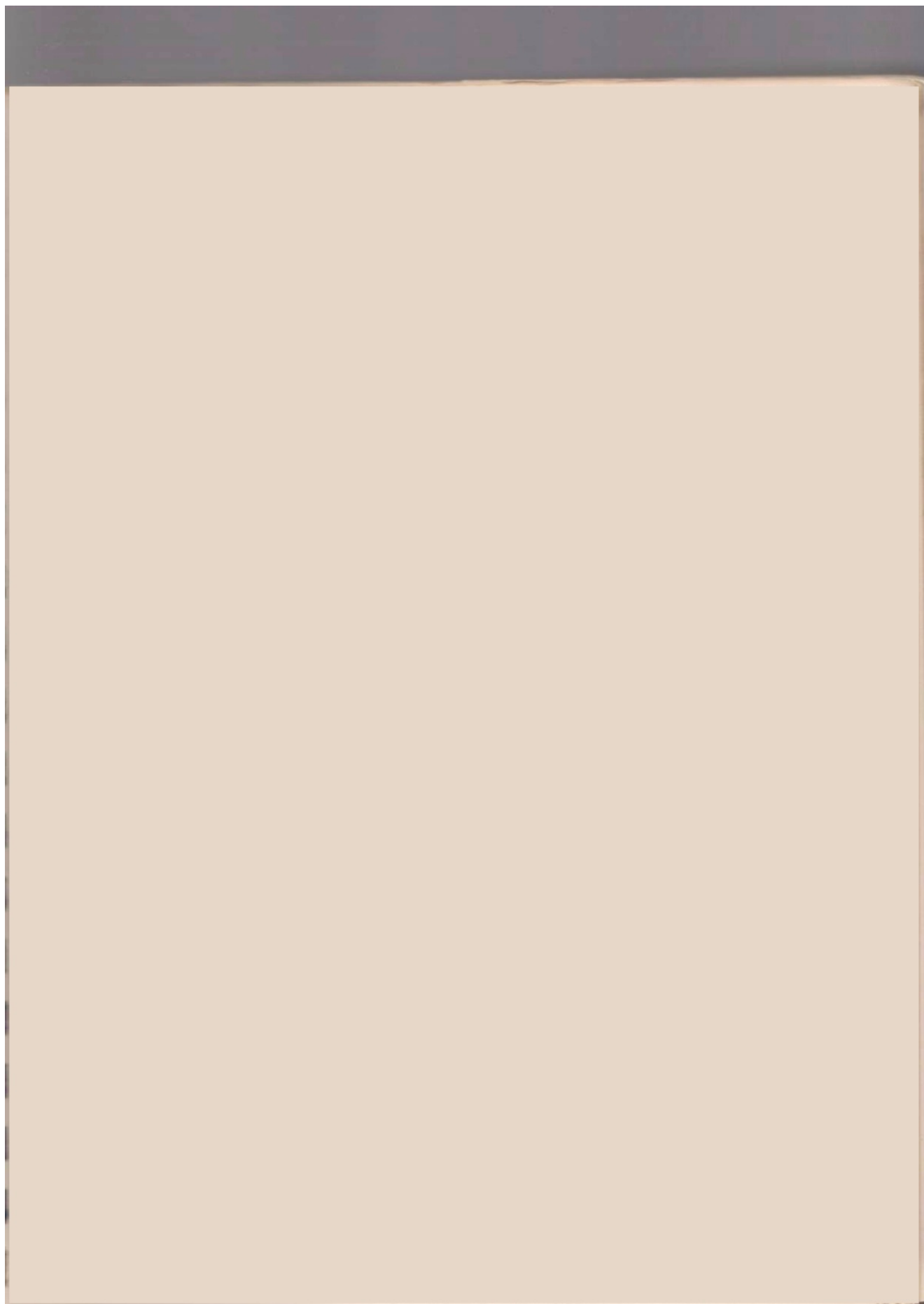
STATION 86+00 TO STATION 160+00

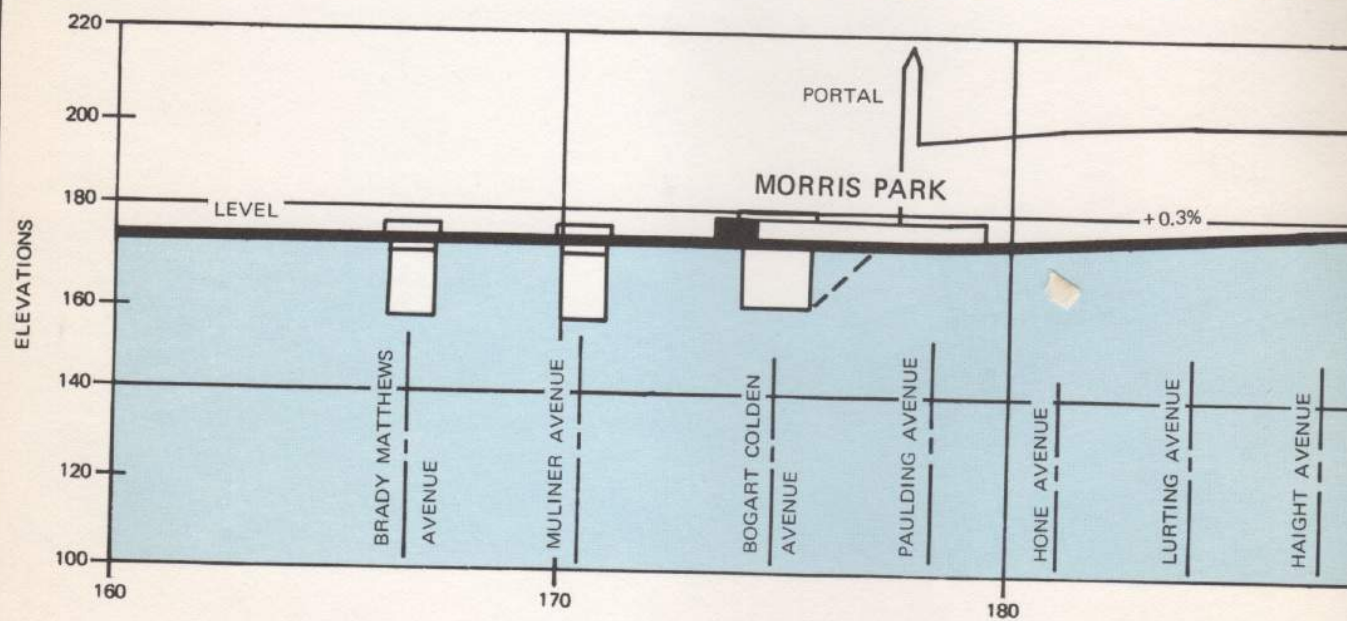
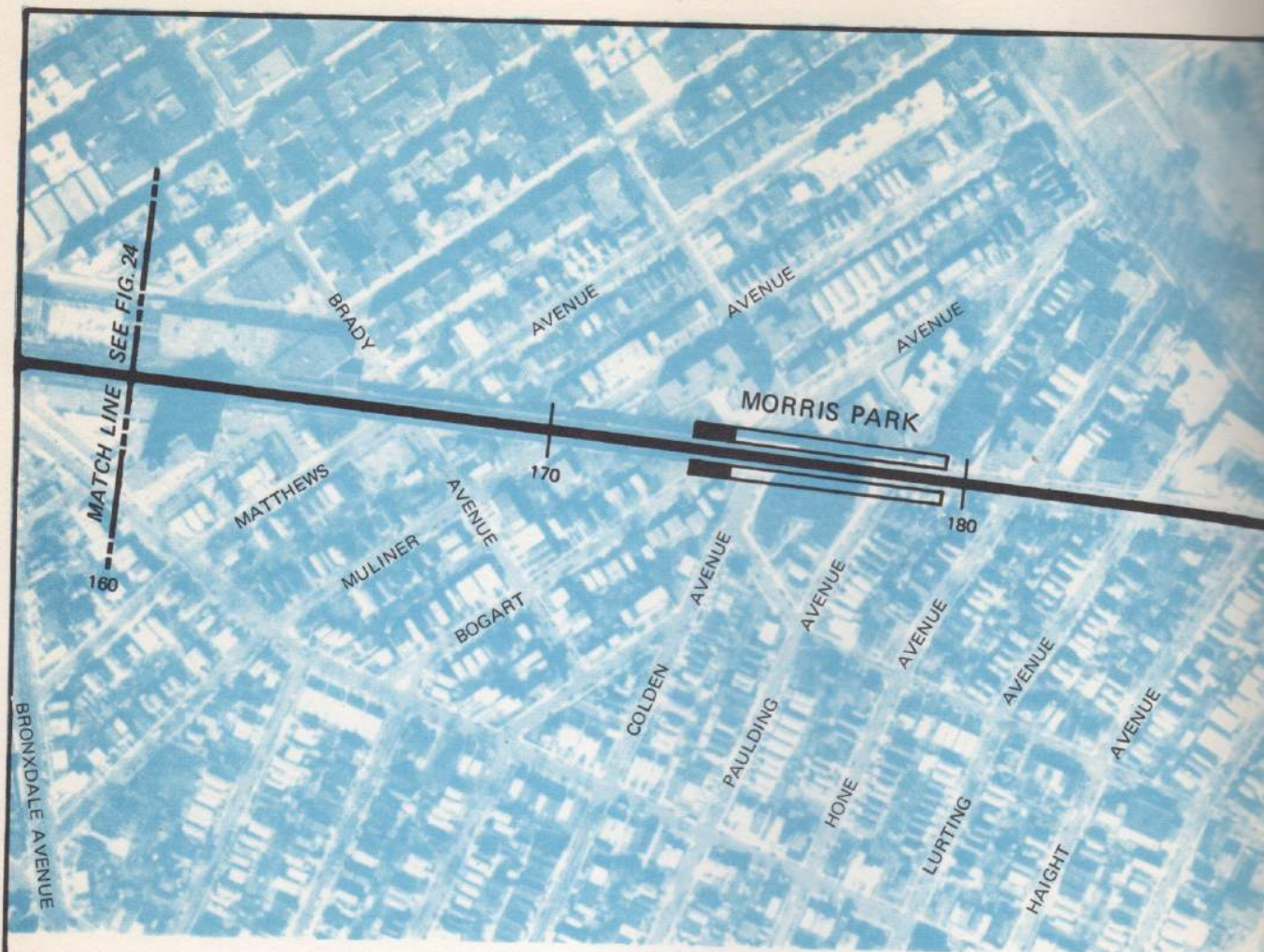


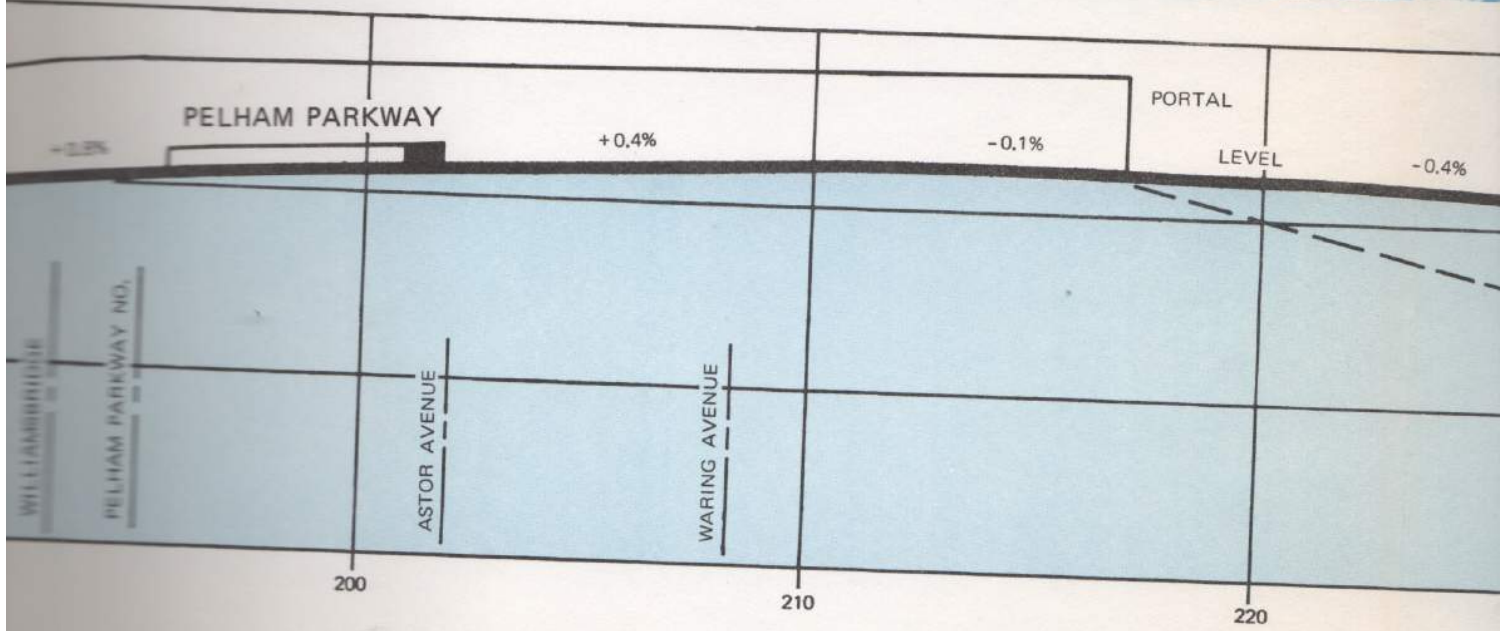
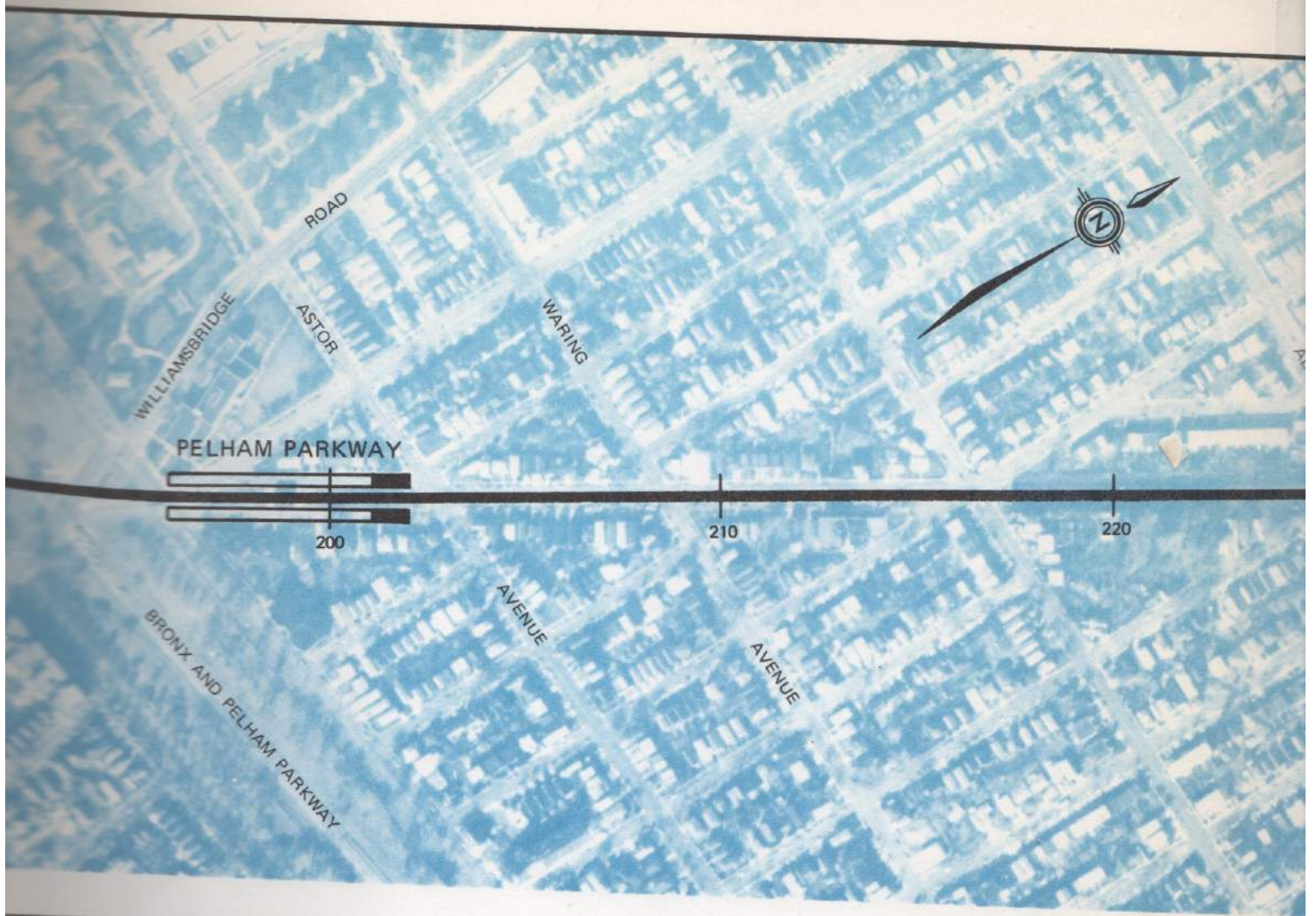
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
DYRE AVENUE CORRIDOR
E 174TH STREET
TO
BRONXDALE AVENUE

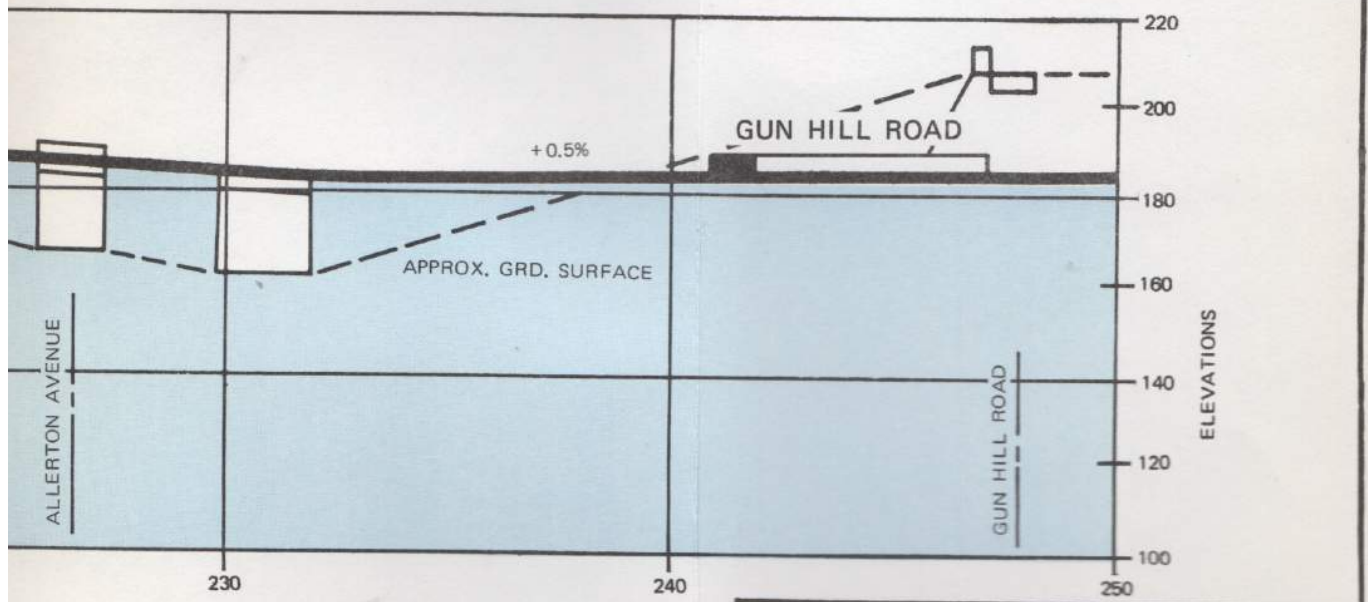
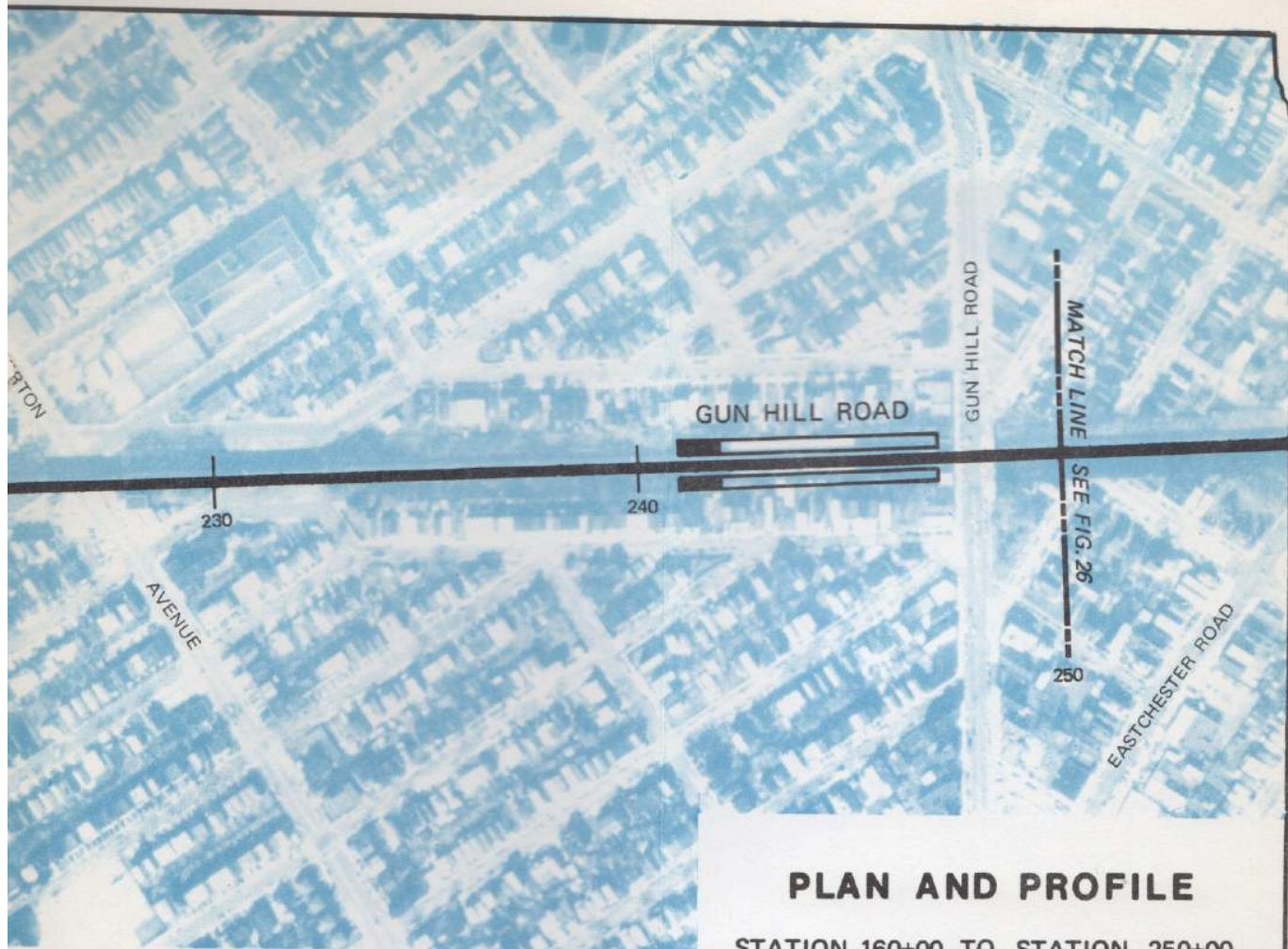
TS C-230

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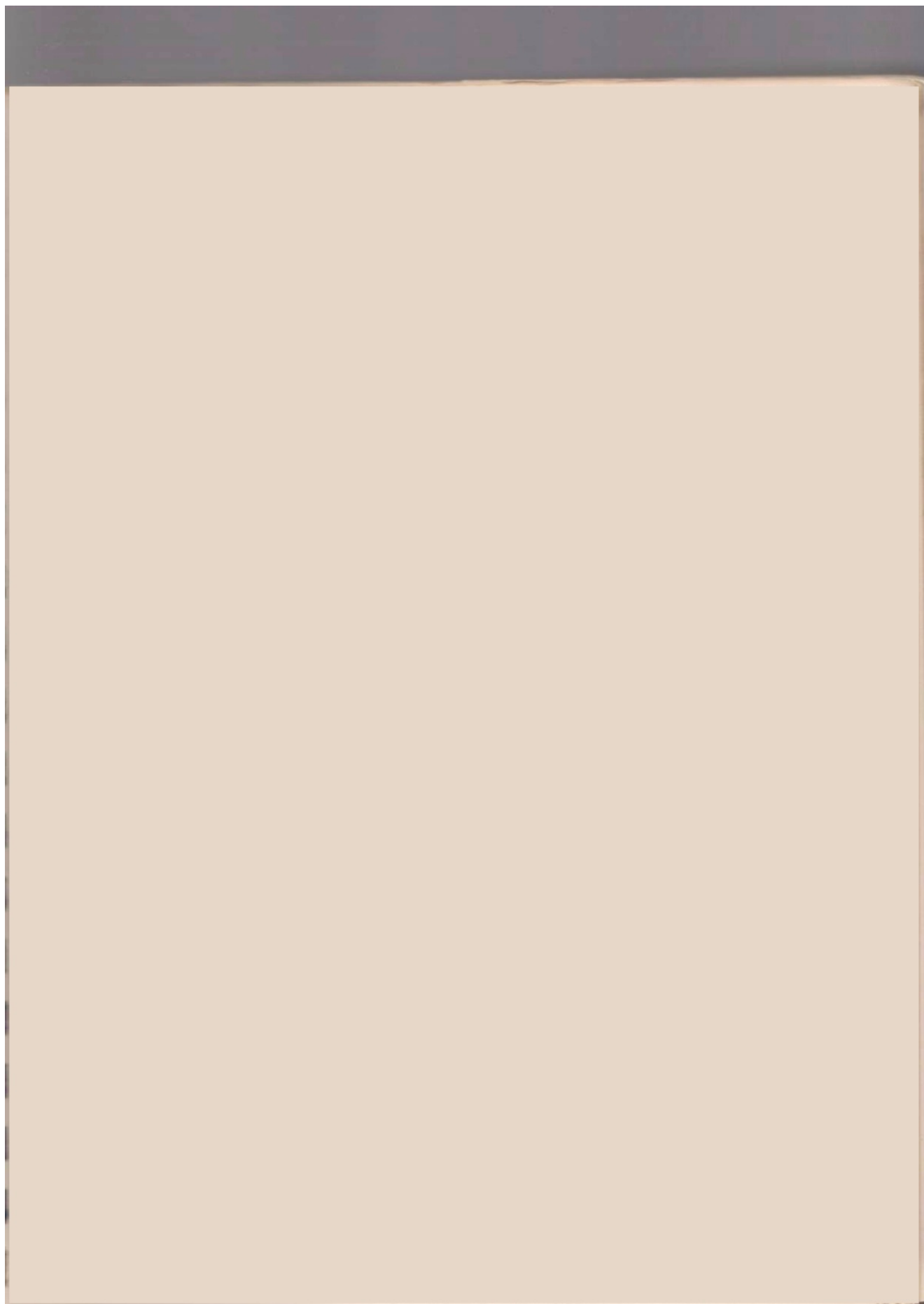


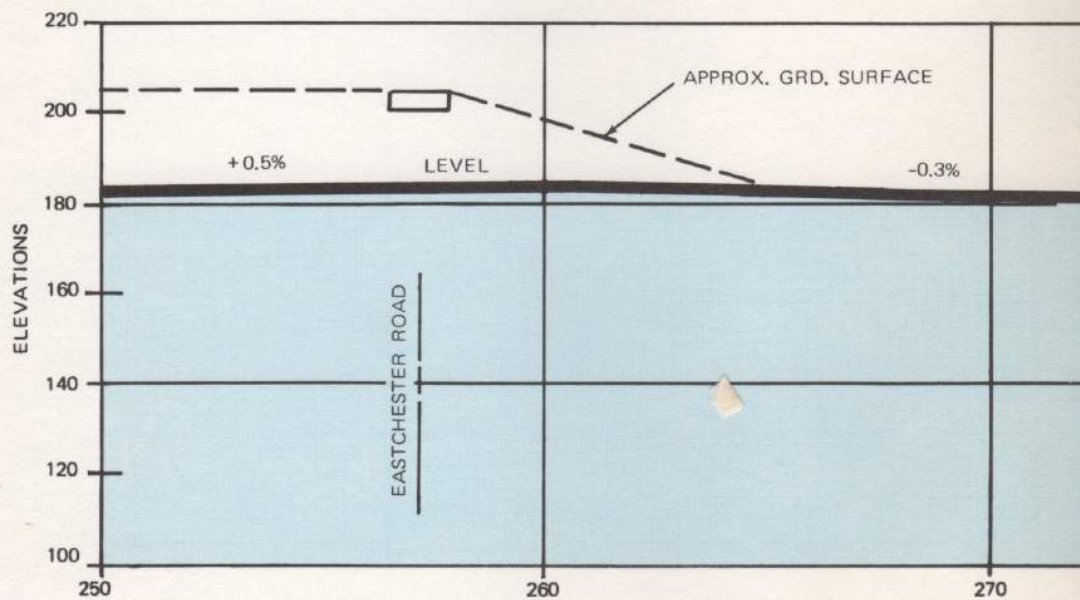


RAPID TRANSIT EXTENSION TO
 NORTHEAST BRONX, N.Y.
 DYRE AVENUE CORRIDOR
 BRONXDALE AVENUE
 TO
 GUN HILL ROAD

TS C-230

25





E. 222ND STREET

BAYCHESTER AVENUE

BOSTON ROAD

BAYCHESTER AVENUE

280

290

300

BOLLER AVENUE

BAYCHESTER AVENUE

- 0.8%

BOLLER AVENUE

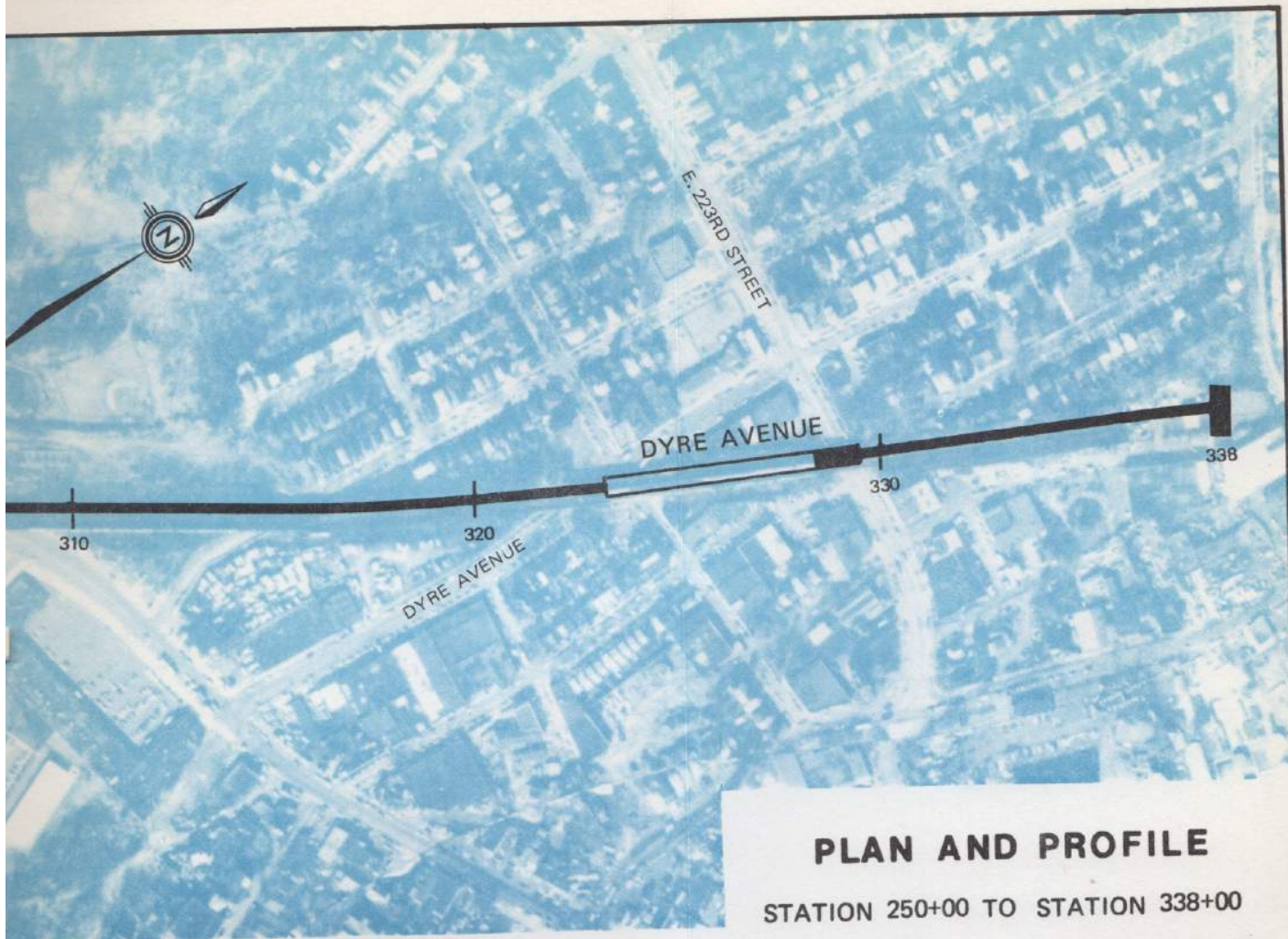
E. 222ND STREET

BAYCHESTER AVENUE

280

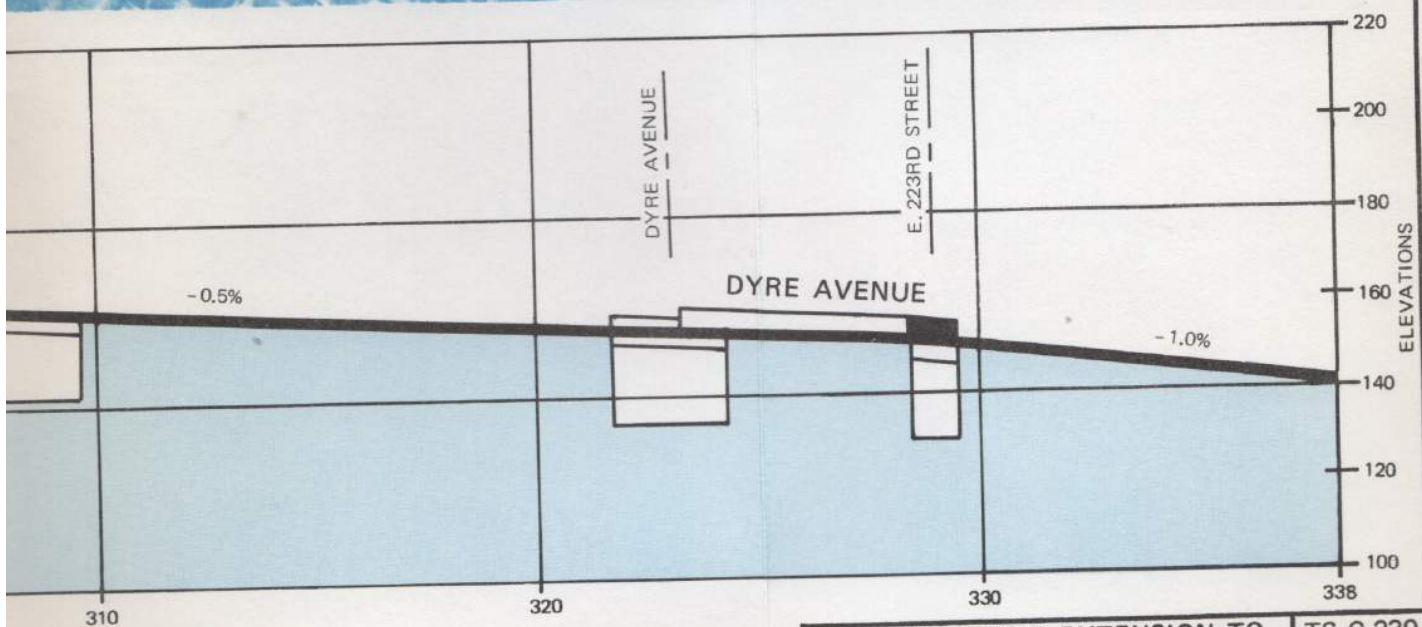
290

300



PLAN AND PROFILE

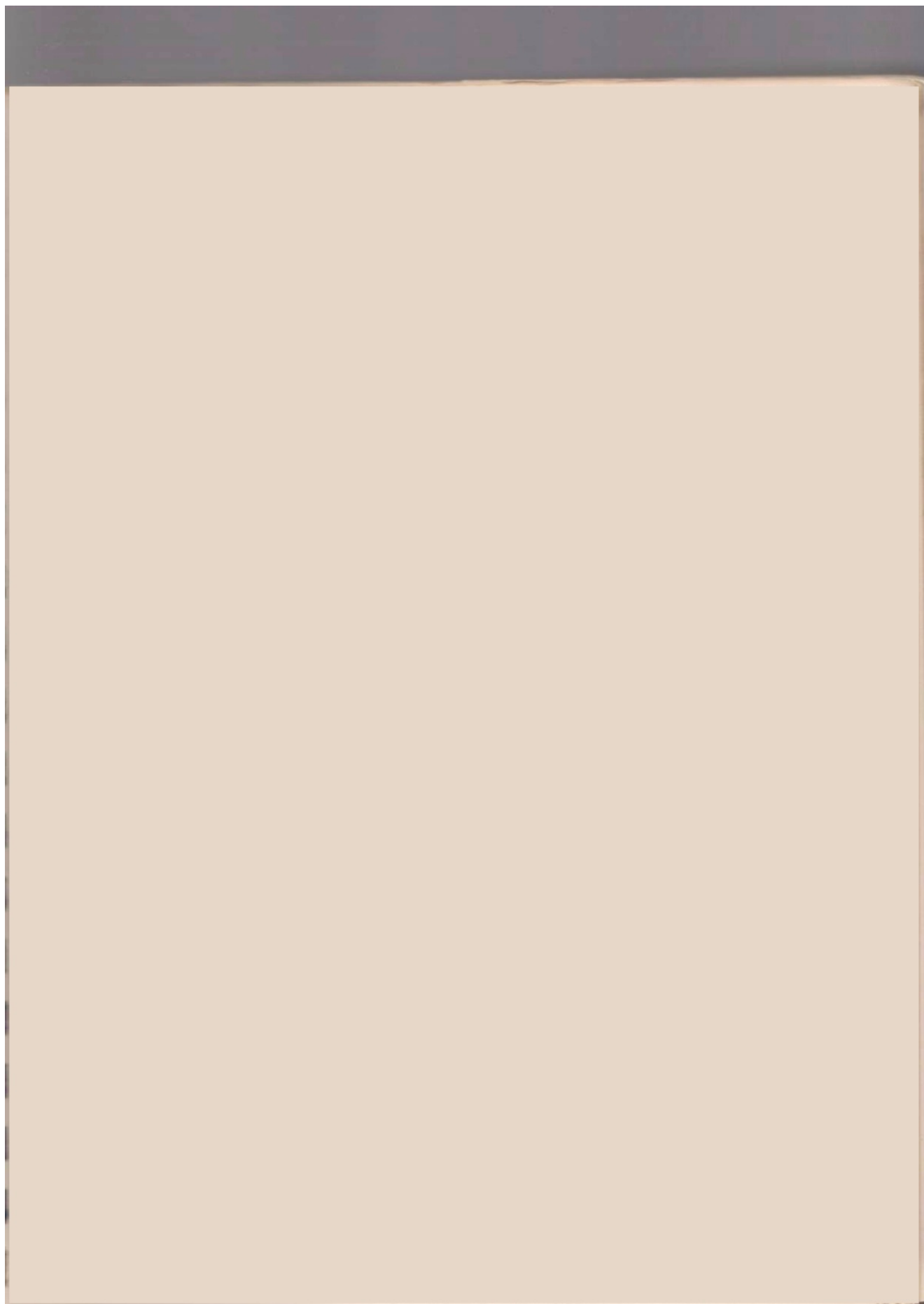
STATION 250+00 TO STATION 338+00



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
DYRE AVENUE CORRIDOR
GUN HILL ROAD
TO
223RD STREET

TS C-230

26



The modifications required to bring the Dyre Line up to "B" Division standards are basically simpler to accomplish than for either the Pelham or White Plains Road Lines. There are two reasons for this, first the portion south of E. 180th Street does not have revenue operations and therefore, any work required could be easily managed, second the portion north of E. 180th Street is essentially all embankment or open cut type construction which lends itself easily for modification to "B" Division standards. This work is outlined more specifically as follows:

a. Structural - Architectural

For approximately 1000 feet north of E. 174th Street the Dyre ROW is on grade therefore, the only modification required in this area is the preparation of the roadbed to receive the new track work.

For approximately 1800 feet between E. 177th and E. 180th Streets the corridor consists of a four track steel bent type elevated structure with a concrete deck and ballasted track roadbed. The modifications required are that the entire concrete deck together with the easterly two track portion of the structure should be removed. The remaining westerly two track structure can then be upgraded by replacing all deteriorated secondary and main steel members and then cleaning and painting the entire structure. The structure can then receive the new track work which will be NYCTA Type III track (wood ties on steel girders) eliminating any future drainage problems which the present concrete deck creates on the existing structure. It should also be noted that the existing stringers are 6'-6" on center while NYCTA standards require 5'-0" on center, also cover plates are located at various points on the spans which will require shims to bring the new track work up to a common elevation. These conditions should not preclude using the structure for Second Avenue Line operations. The original design of the structure was based on heavy railroad freight operations therefore, there is ample structural strength for operating rapid transit rolling stock.

These modifications would require the removal of the NYCTA service track between the Penn Central and White Plains Road Line. However, this can be substituted for in Westchester Yard as stated in Chapters IV and V. Also new station and alignment considerations north and south of these embankment and viaduct areas for any of the specific proposals are discussed in chapter V.

The ROW north of E. 180th Street consists of the NYCTA Dyre Avenue Line. It is four tracks wide, operations are on the two outside tracks, the two middle tracks having been removed. The rolling stock used is of the "A" Division type, therefore, as with the Pelham and White Plains Road Lines the existing station platforms have to be lengthened by 90 feet and the edges have to be cut back 6 inches.

At Morris Park, Pelham Parkway, Gun Hill Road and Baychester Avenue stations the extensions can be raised reinforced concrete platforms supported on concrete spread footings, these can all be constructed within the existing ROW easily and with minimal interference to the existing operations on the line. At the Dyre Avenue terminal the single island platform extension is required to be made at the north end to avoid reconstruction of the crossover at the south end of the station. This can be done easily by utilizing for support of the new platform, the longitudinal girders of the existing bridge over 233rd Street.

Architecturally all the existing station mezzanines will be completely refurbished as with the Pelham and White Plains Road Lines.

b. Track

The existing track work can remain as is. The contact rail would require a lateral and vertical adjustment to be compatible with "B" Division standards. No track work is required to accommodate the platform extensions.

c. Signals

The existing wayside signal system will require removal and replacement with a cab signaling system. In addition the existing wayside signal system will require modification to accommodate the platform extensions and for a period of time both wayside and cab systems will be in place until conversion to Second Avenue Line operations take place.

d. Power

Presently on the Dyre Avenue Line north of E. 180th Street three substations are in use. This should be sufficient for any Second Avenue operations. Between E. 180th and E. 174th Streets one new substation will be required, since in this area

completely new trackage will be added. In addition miscellaneous power modifications will be required to accommodate the platform extensions.

e. Line Equipment

At the station platforms and mezzanine areas new fluorescent lighting will be installed. In addition miscellaneous line equipment modifications will be required to accommodate the platform extensions.

In summary the Dyre Line can easily be converted to Second Avenue operation and in addition it can be done at relatively low cost and with a minimum of impact on existing NYCTA operations.

The Penn-Central Railroad Corridor

The Penn Central Corridor within the study area that can be used for extending the Second Avenue Line consists of approximately 29,000 feet of open cut and embankment structure from the intersection of Lafayette and Longwood Avenues north to the Hutchinson River. Reference to Figure 27, Figure 28, and Figure 29 is made. At Hunts Point Avenue and at E. 174th Street the connections, stations, transfer facilities and all other new construction that may be required to extend the Second Avenue Line along this corridor for any specific proposal will be outlined in Chapter V.

The line was designed and constructed in the later part of the nineteenth century by the New York, New Haven and Hartford Railroad and subsequently was connected to the Hellgate Bridge over the East River. When this was completed it made possible a direct railroad connection from New England to the Pennsylvania Railroad system via the new Pennsylvania Station in midtown Manhattan. The basic right-of-way from Longwood Avenue to the Hutchinson River in the study area can accommodate six tracks, however, at the present time only the four westerly tracks are in place, however, the four tracks converge and only two tracks continue north over the Hutchinson River. The line is completely electrified with an 11,000 volt alternating current overhead catenary supported by steel towers spanning across the entire width of the six track roadbed and located approximately 250 feet on center.

There are no grade crossings, all local streets pass either over or under the line with a clearance of approximately 18 feet provided. The alignment is of a very high standard. The minimum radius being 2,000 feet and maximum grade 0.6%. However, presently the right-of-way is not in the best condition, at various locations it is accessible from local streets, and automobile parts, furniture and other miscellaneous refuse is located throughout.

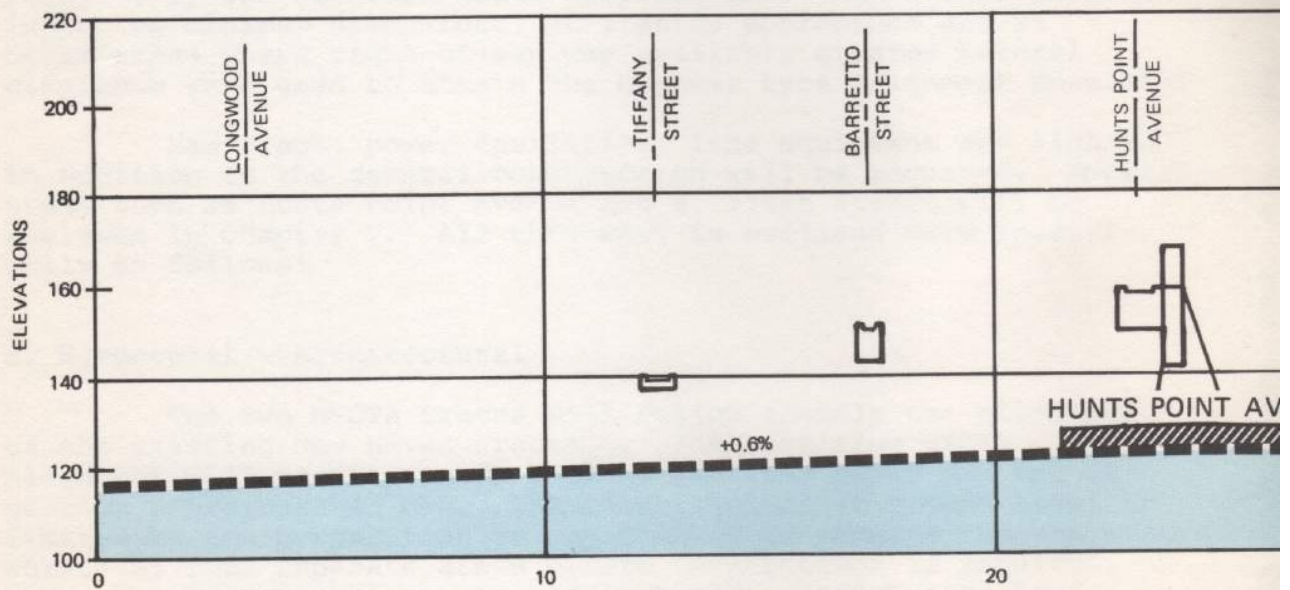
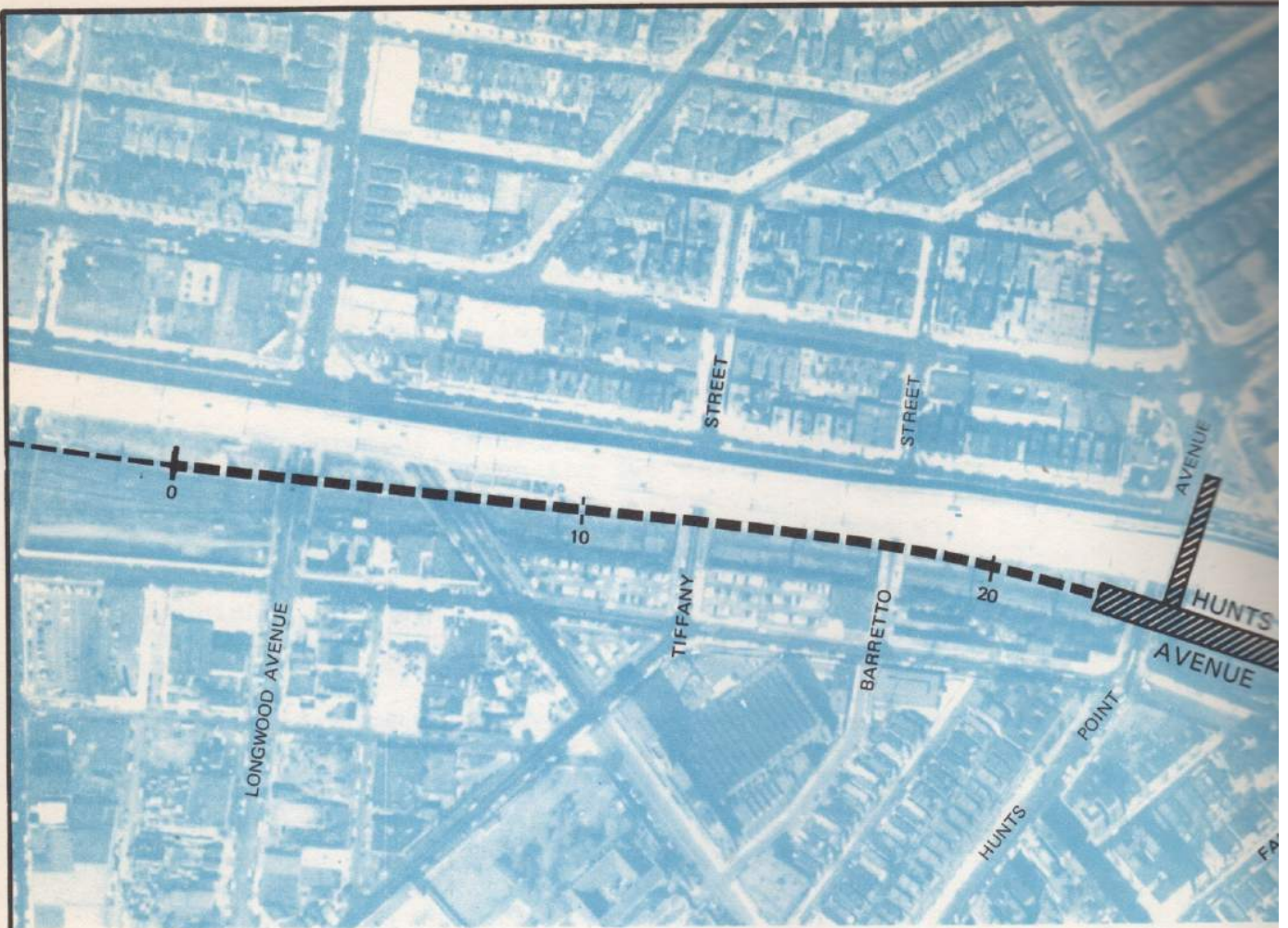
The present railroad operations consist of a long distance Amtrak service on the two easterly tracks and a freight service on the westerly tracks. Penn Central Railroad (The New York, New Haven and Hartford Railroad was merged with the Penn Central in 1967) officials at several meetings with NYCTA and MTA personnel have stated that the westerly most track can be relinquished to the Transit Authority for Second Avenue Line use. It is on this basis that the utilization of this corridor is made attractive and feasible.

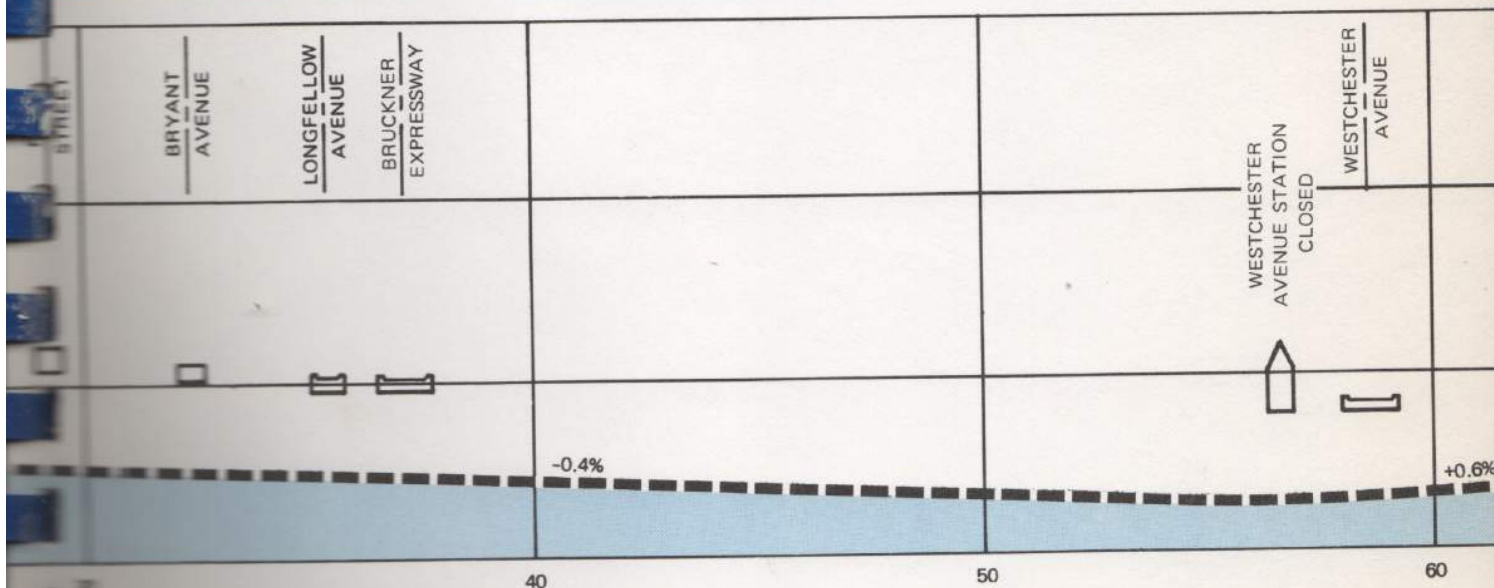
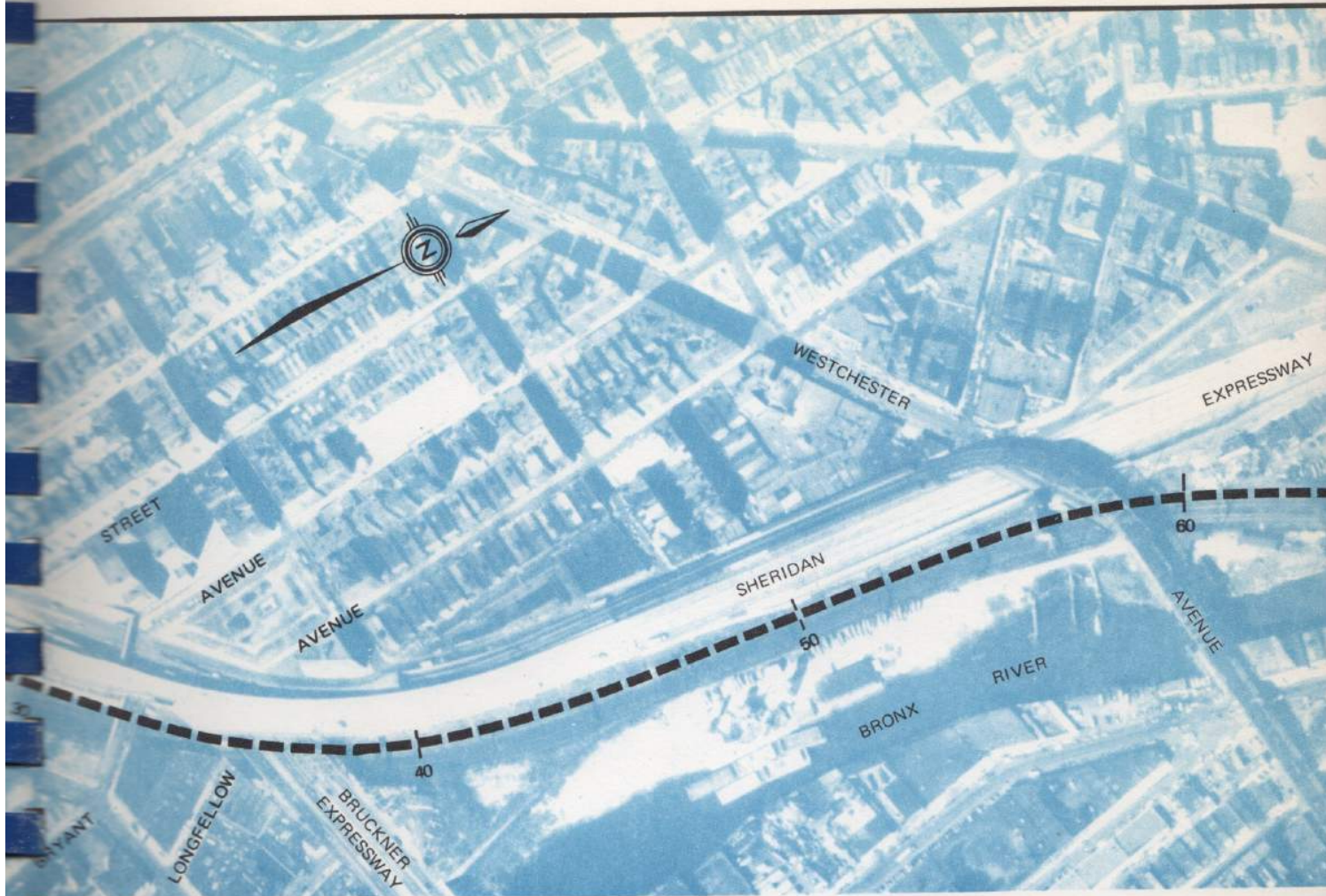
Reference to Figure 30 is made. This section indicates the proposed NYCTA tracks and their relation to the existing New Haven tracks. The existing westerly track will be removed and the steel towers supporting the catenary will be cut back and supported on a new column between the NYCTA and New Haven trackage. The dimensions indicated were established by Transit Authority operating departments as their minimum requirements. The 8'-6" dimension from the westerly New Haven track to an obstruction is required by the New York State Railroad Law. Again this section indicates minimum dimensions, at station approaches and at other areas where right-of-way was available greater lateral clearance were used to attain the highest type alignment possible.

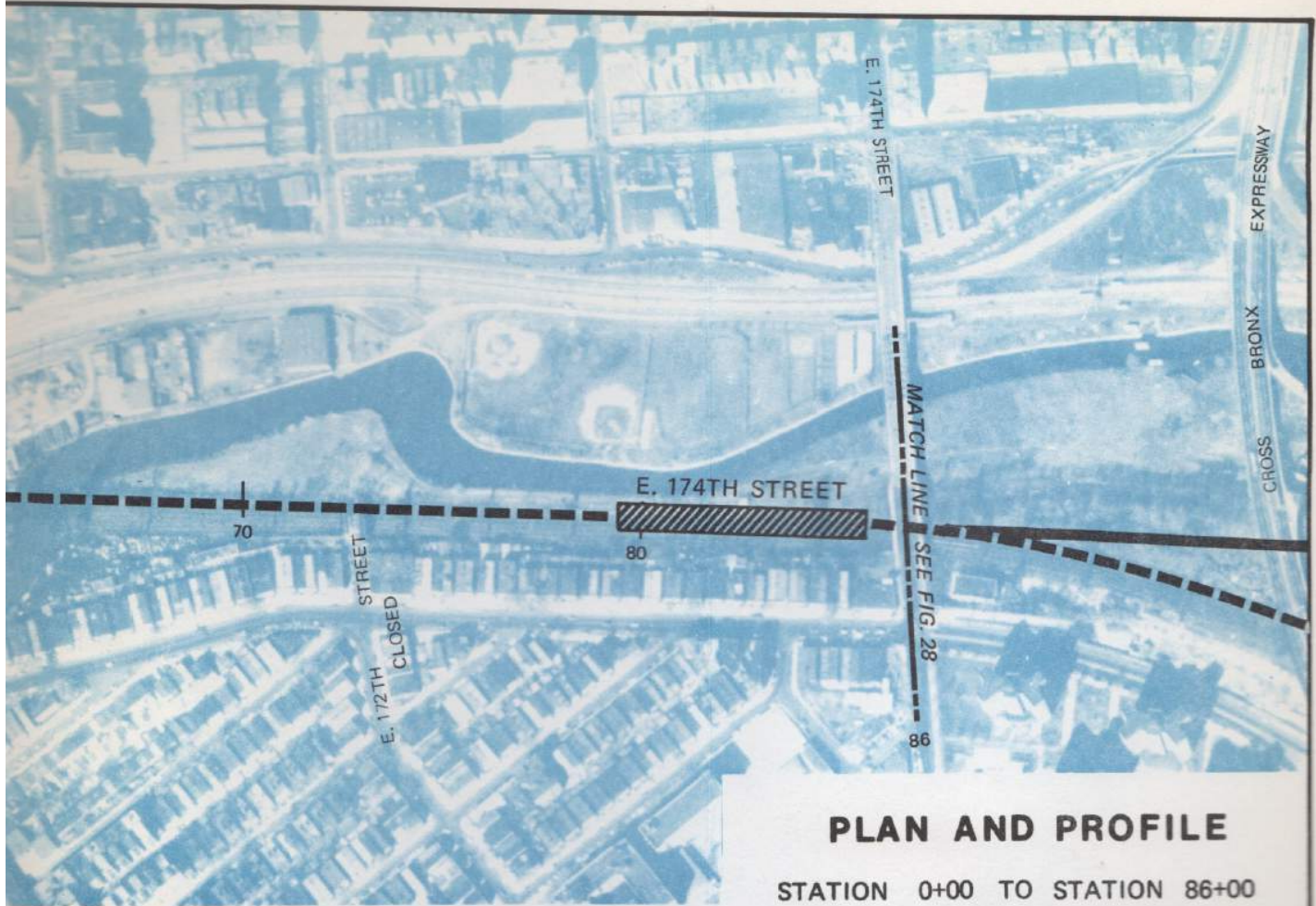
New track, power facilities, line equipment and signals in addition to the general construction will be required. Special areas such as Hunts Point Avenue and E. 174th Street will be reviewed in Chapter V. All this work is outlined more specifically as follows:

a. Structural - Architectural

The two NYCTA tracks will follow closely the alignment of the existing New Haven trackage. The resulting NYCTA alignment will permit speeds between stations of 60 MPH and at station approaches 45 MPH. The work required at ground level is limited to the preparation of the roadbed to receive the track work. At four separate areas bridge construction is required, they are the Bronx River, Bronxdale Avenue, Eastchester Road and Pelham Parkway.

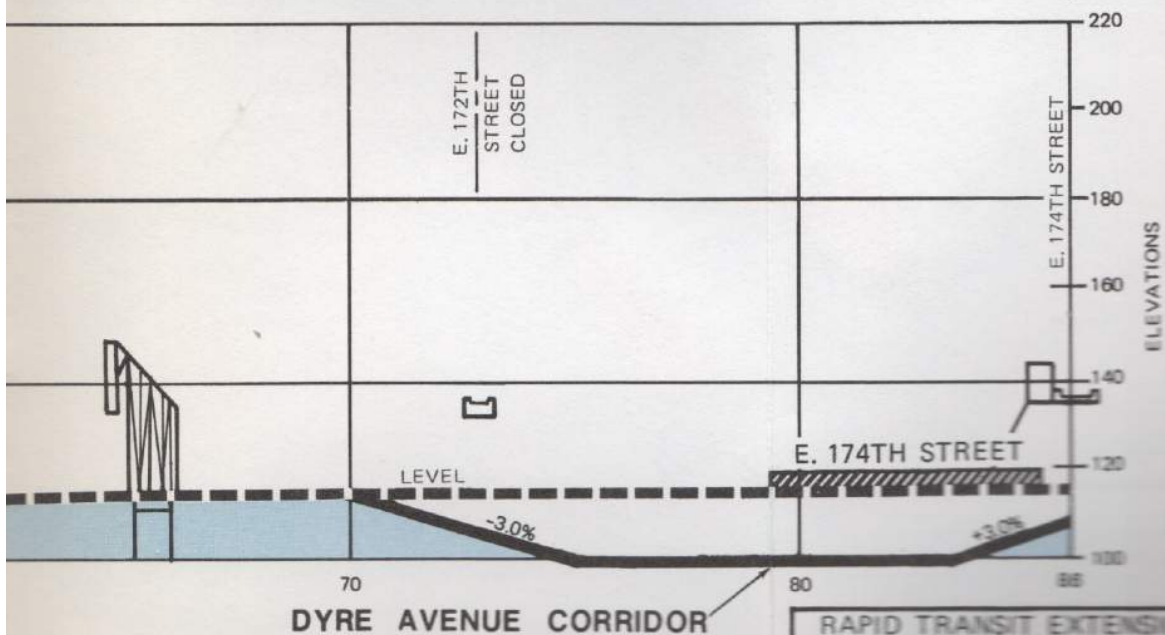






PLAN AND PROFILE

STATION 0+00 TO STATION 86+00

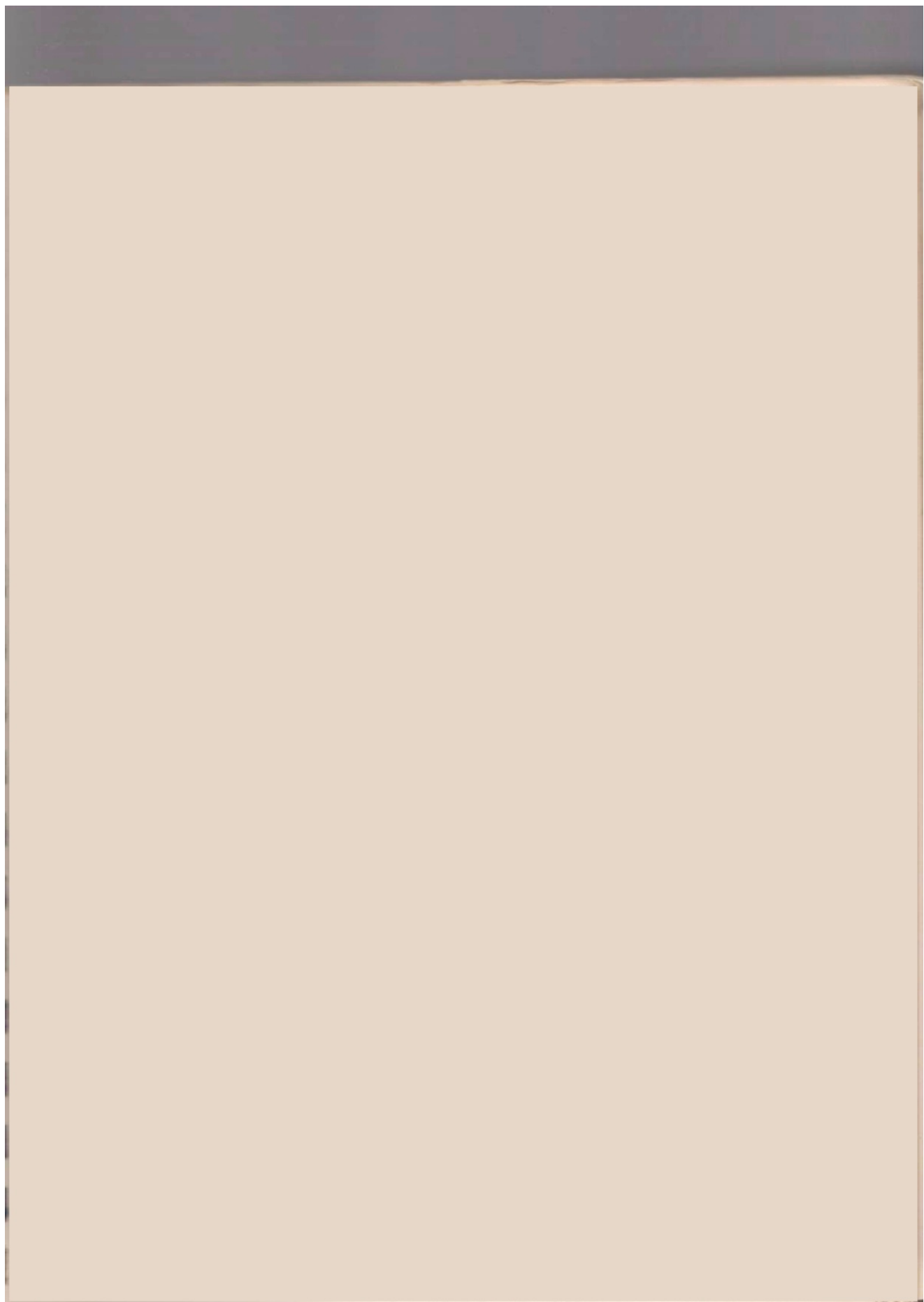


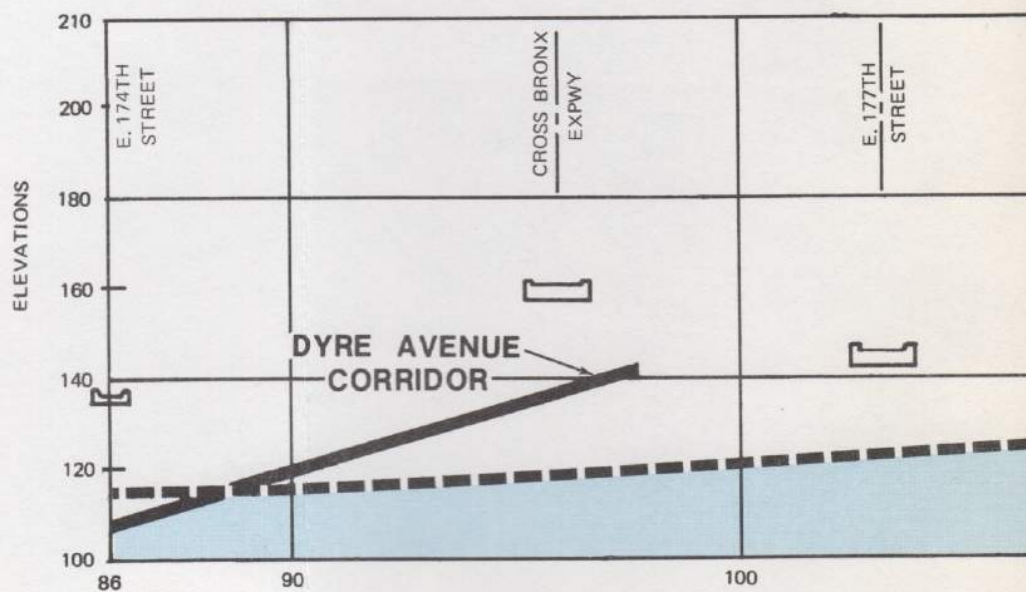
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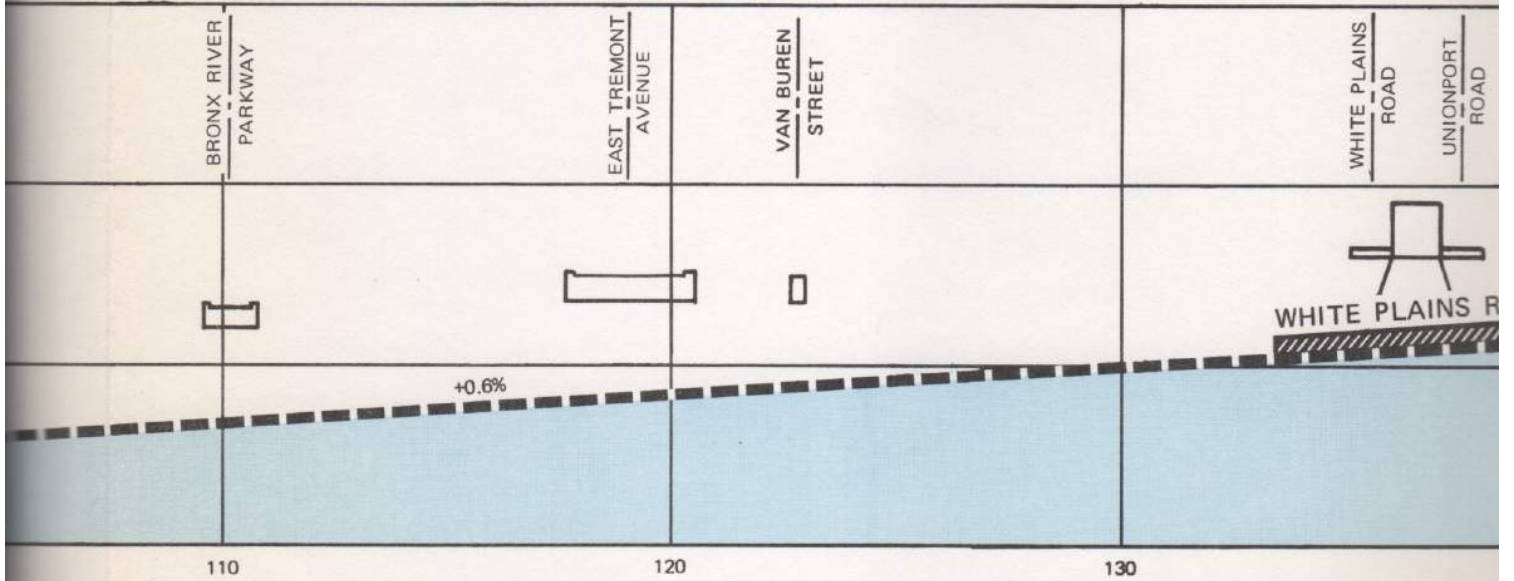
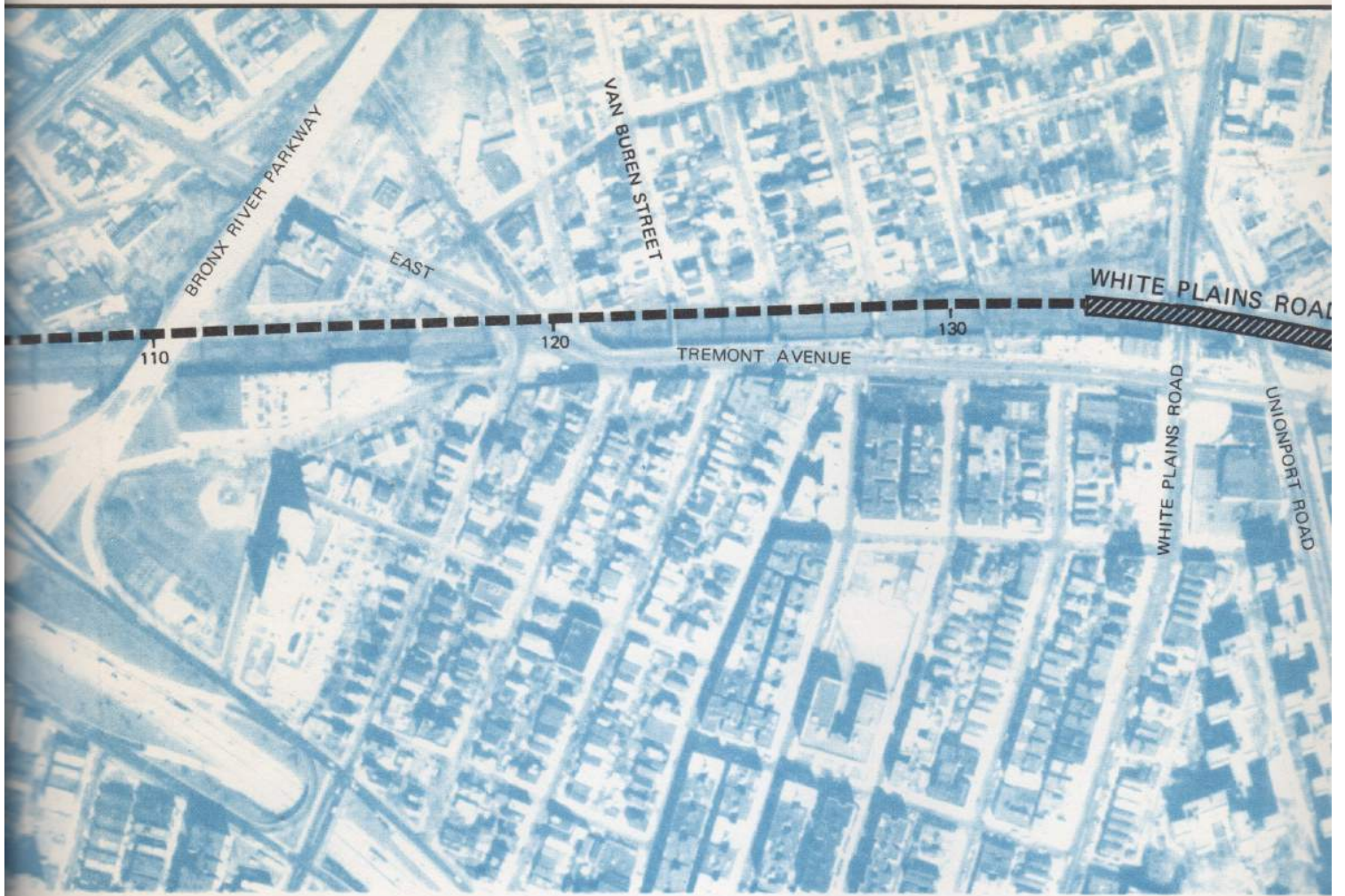
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
PENN CENTRAL CORRIDOR
E 174TH STREET
TO
LONGWOOD AVENUE

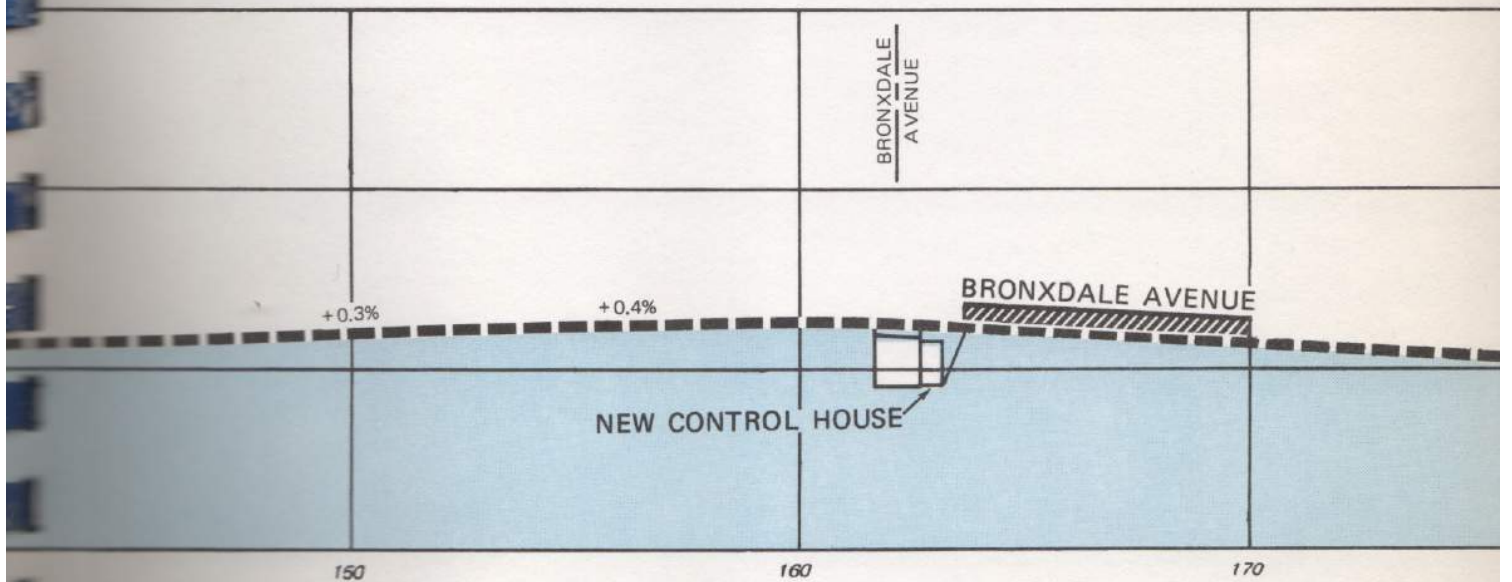
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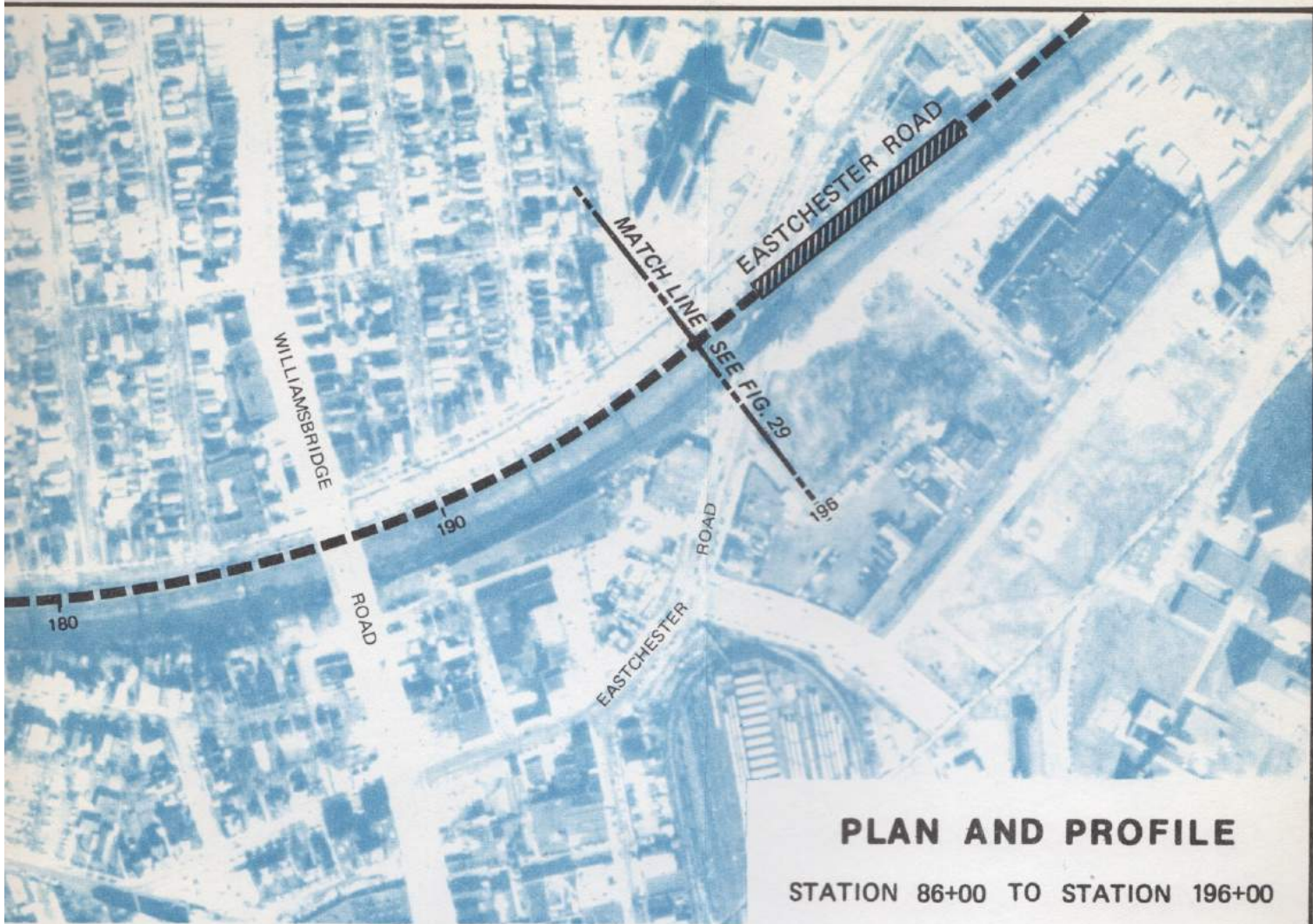
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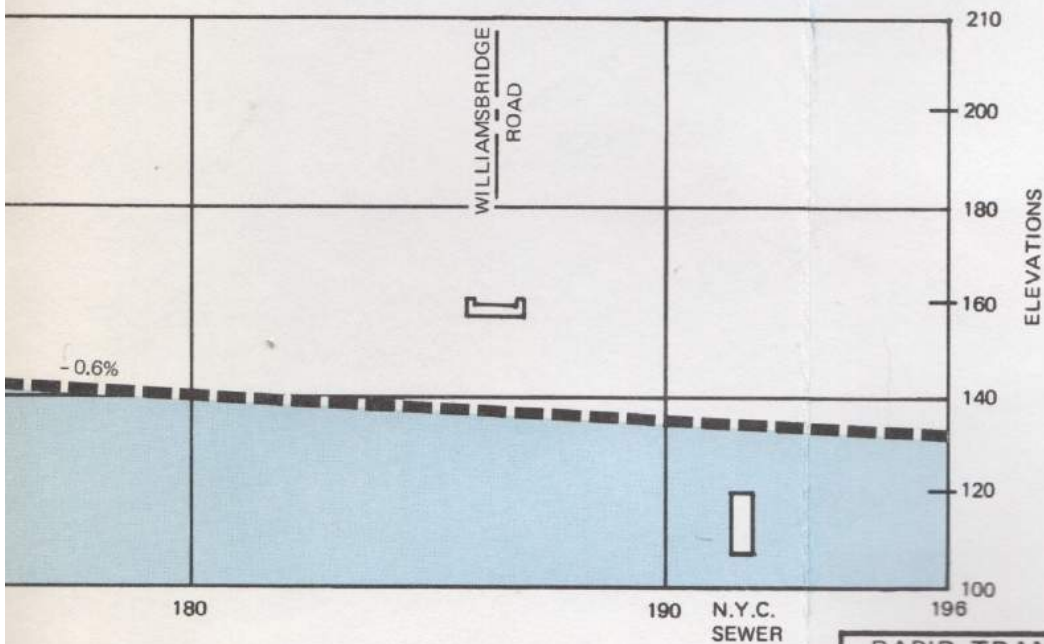








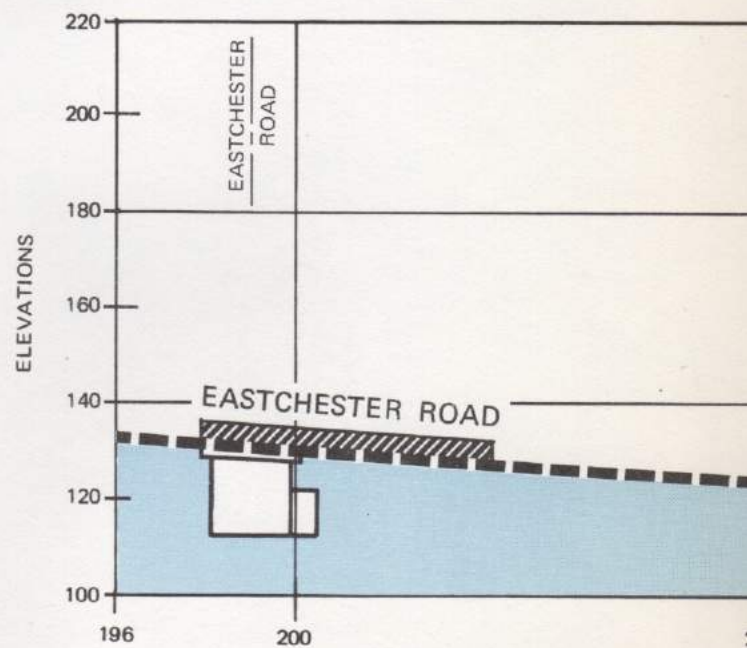
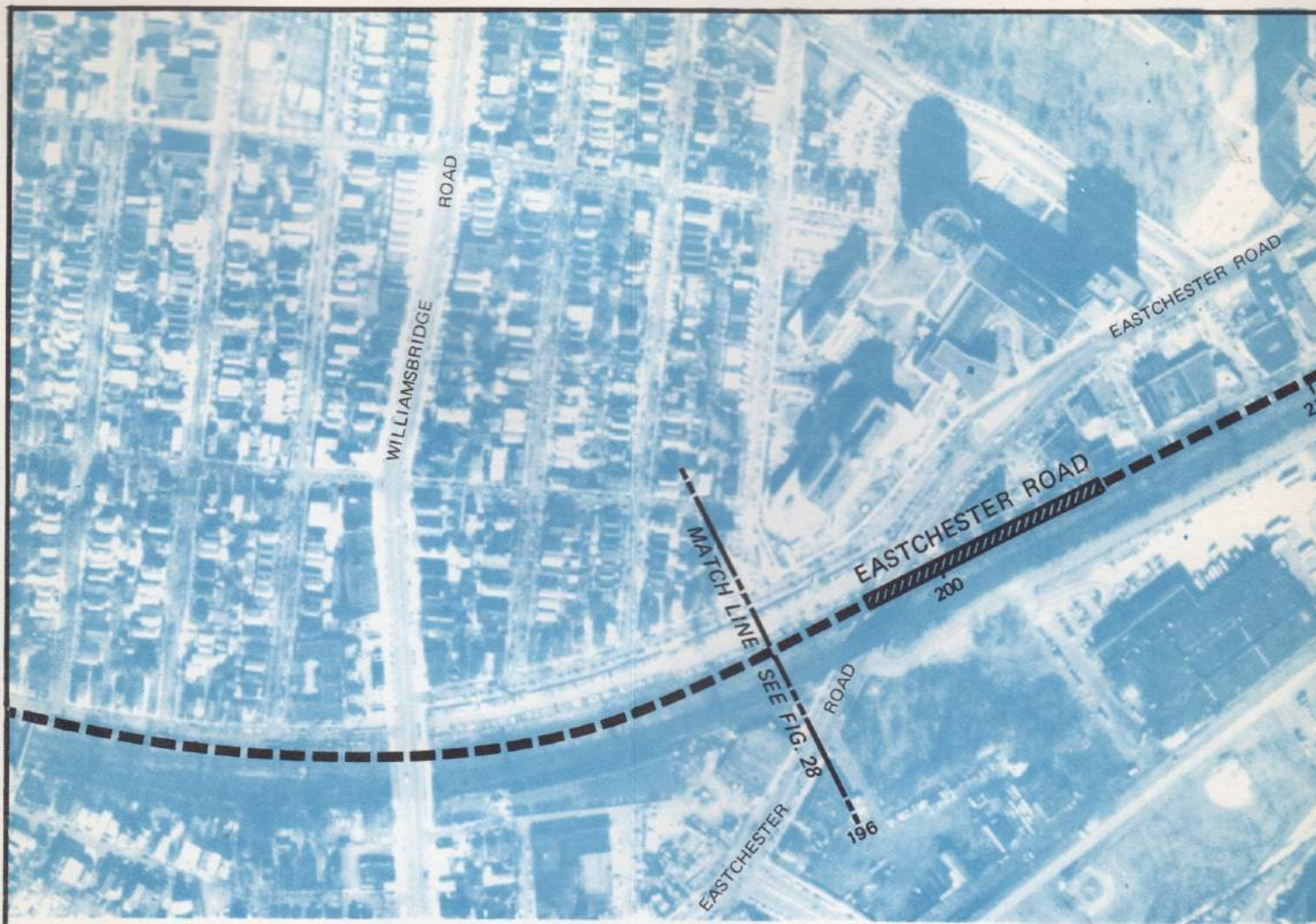
PLAN AND PROFILE
STATION 86+00 TO STATION 196+00

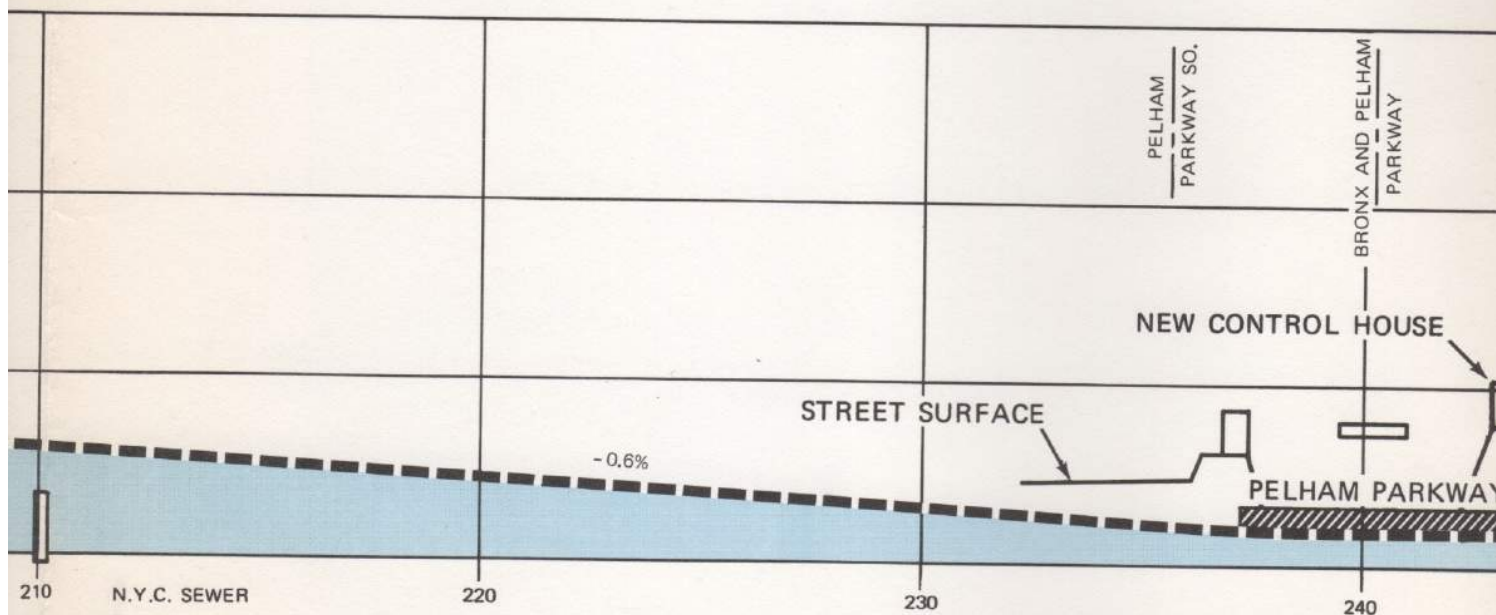
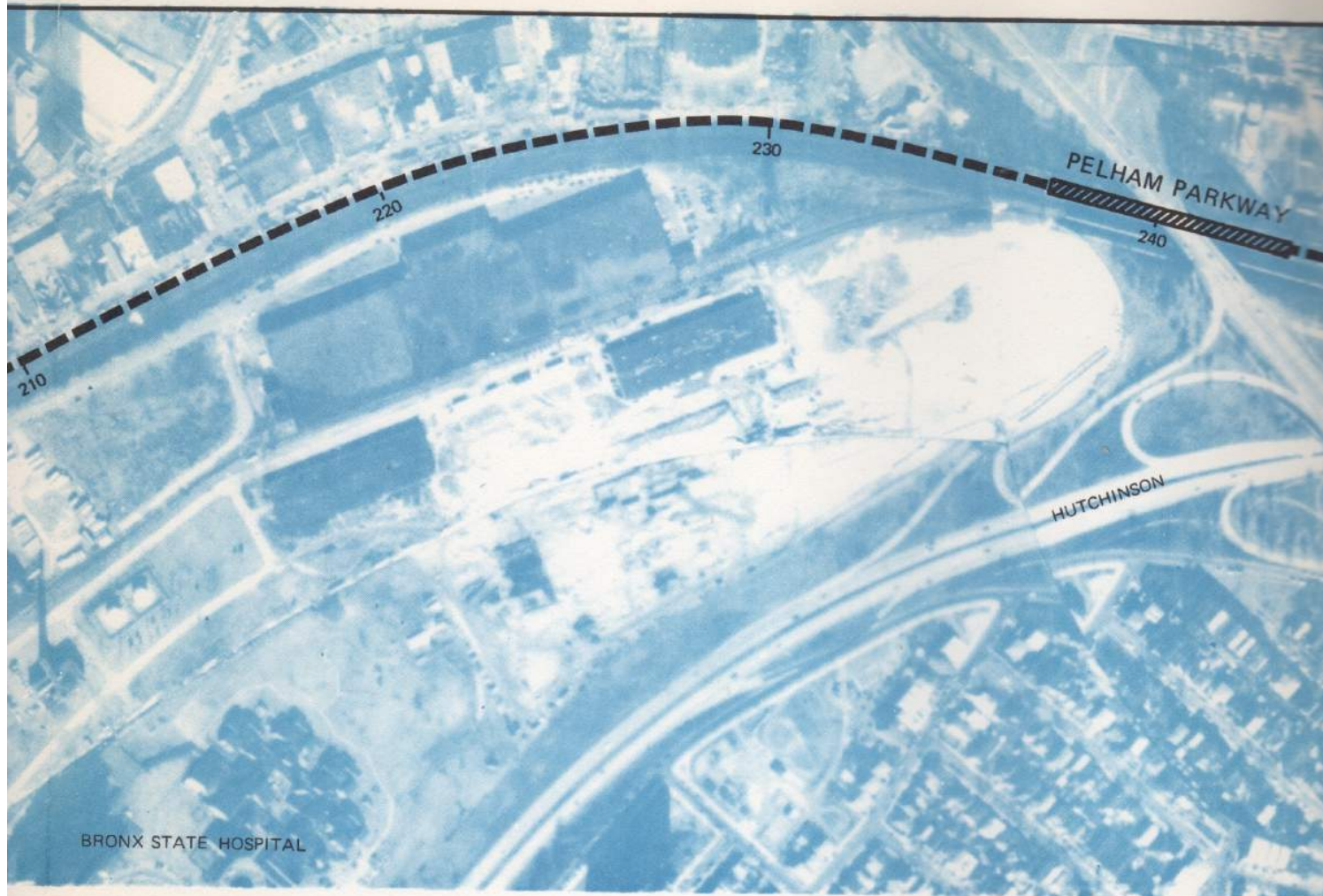


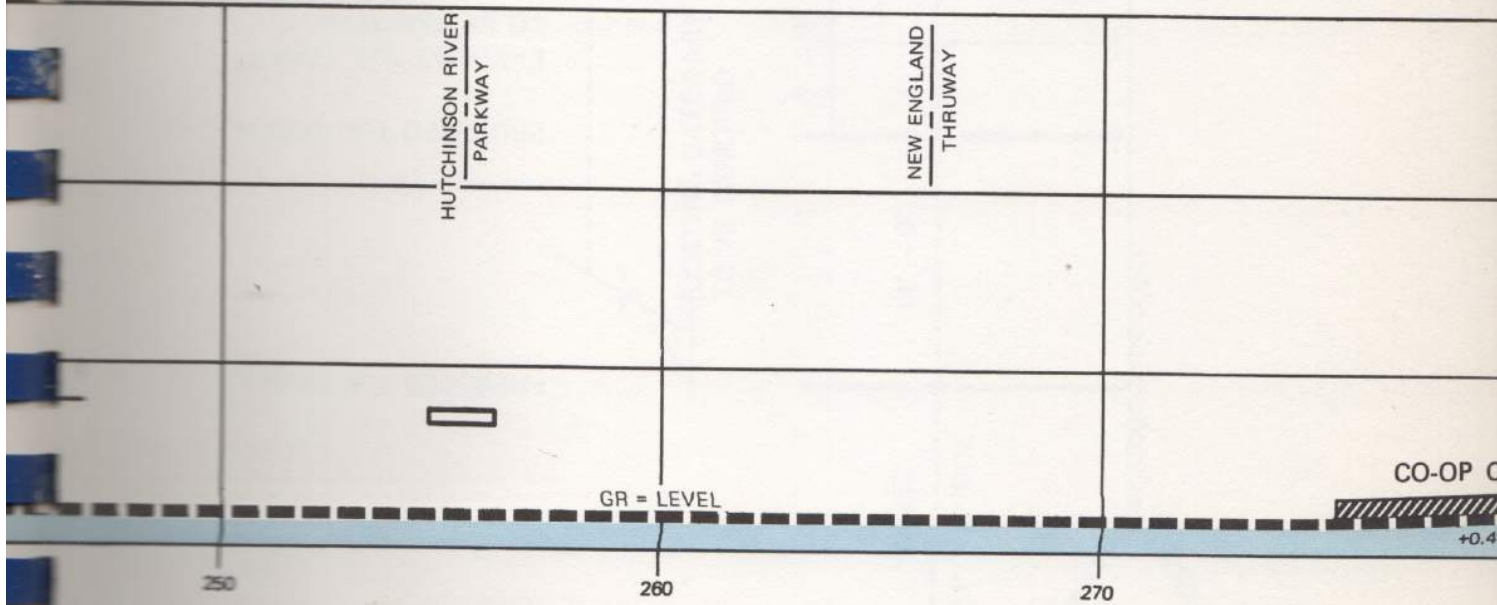
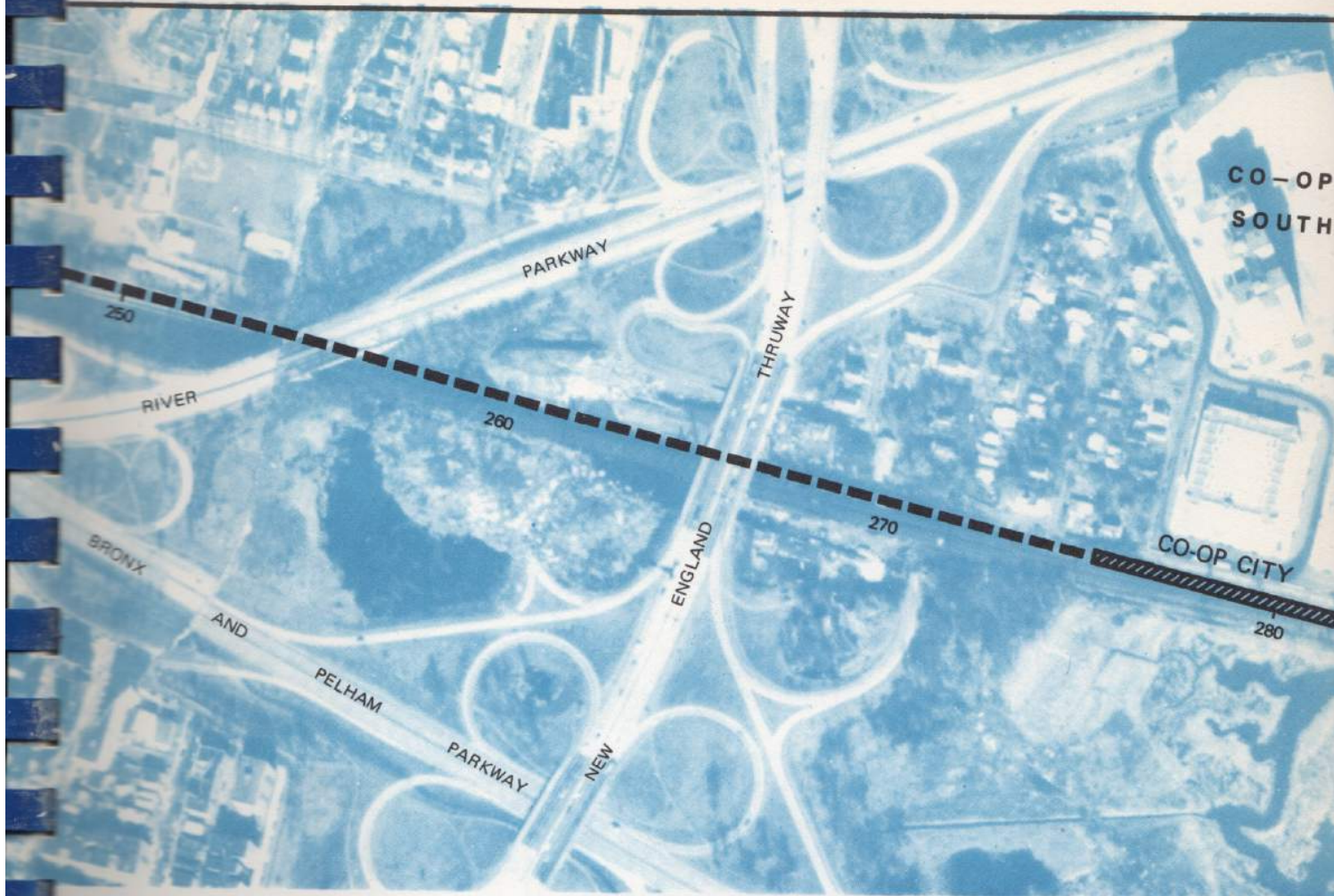
RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
PENN CENTRAL CORRIDOR
E 174TH STREET
TO
WILLIAMSBRIDGE ROAD

TS C-230

28



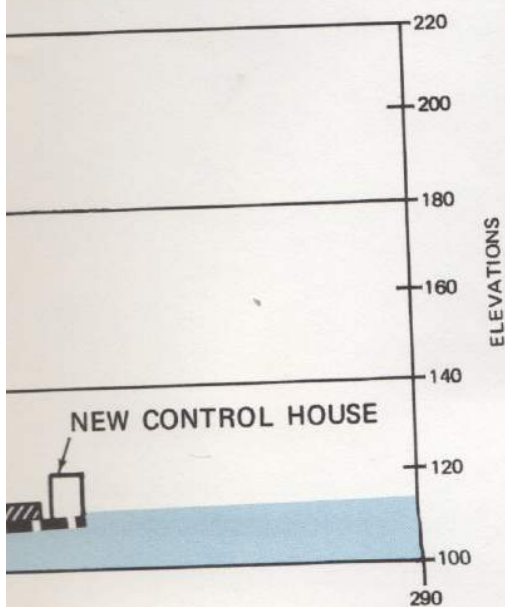






PLAN AND PROFILE

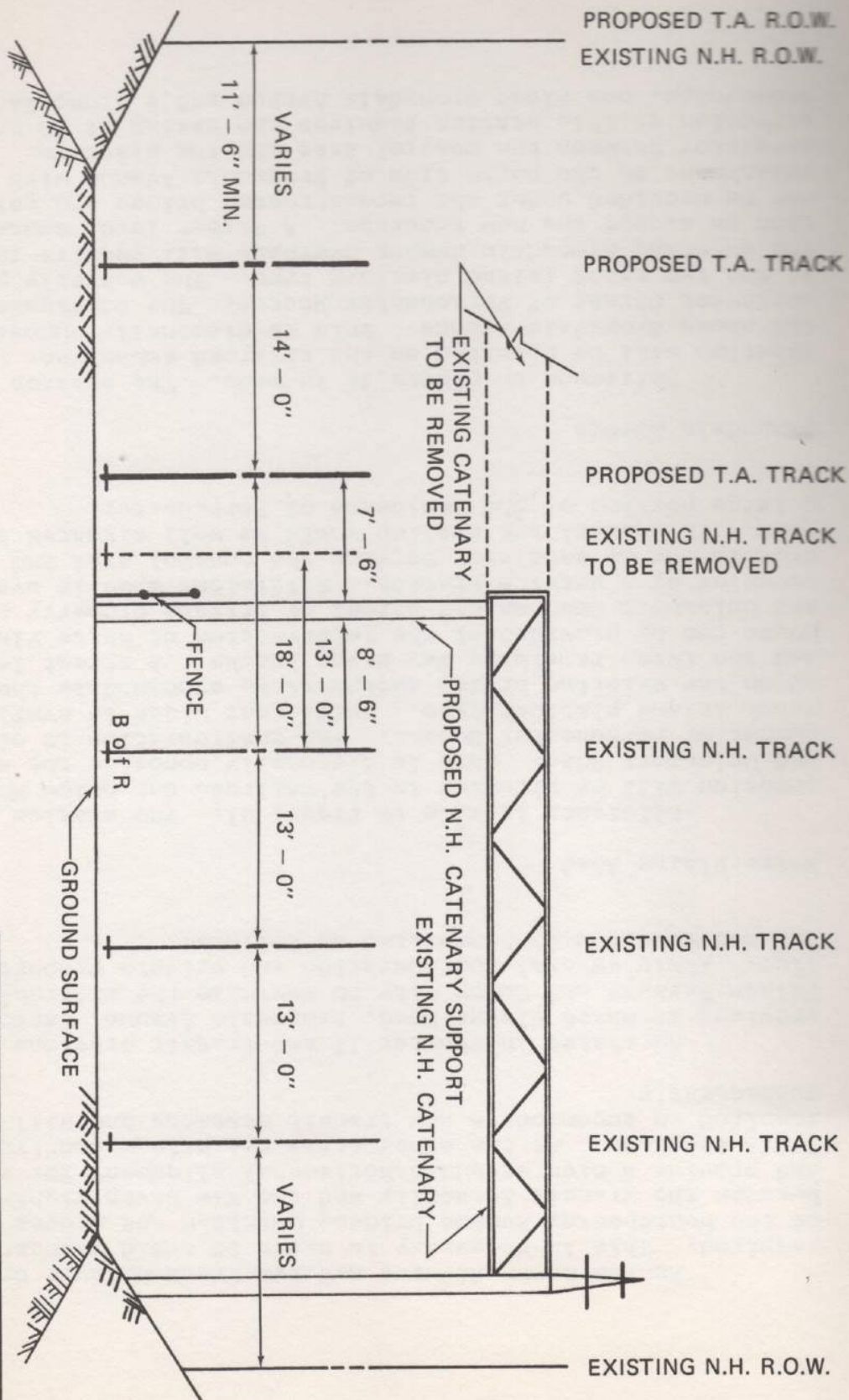
STATION 196+00 TO STATION 282+00



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
PENN CENTRAL CORRIDOR
WILLIAMSBRIDGE ROAD
TO
CO OP CITY

TS C-230

29



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
TYPICAL SECTION ALONG
PENN CENTRAL ROW

TS C-230
30

At the Bronx River a new two track bascule bridge is required. This is necessary in order to avoid reconstruction of the Westchester Avenue bridge, maintain the proper clearances between the Transit Authority and the New Haven right-of-way, and provide a high standard horizontal alignment for the new NYCTA trackage. At the other sites the bridge construction is required to accommodate new transit stations and will be described subsequently.

As stated in Chapter II new transit stations will be required at White Plains Road, Bronxdale Avenue, Eastchester Road, Pelham Parkway and Co-op City to maximize the ridership on this line. Their general configuration and private property required for construction is summarized as follows:

White Plains Road

Reference is made to Figure 31. The station at this location will be situated in the railroad cut below White Plains and Unionport Road. This is diagonally opposite the southwest corner of Parkchester Houses. The configuration is of the two track island platform type. Sufficient width is available between the existing bridge abutments to accommodate the station and the three remaining New Haven tracks. A street level control house can be provided at the intersection of White Plains Road and Unionport Road on one parcel of private property presently occupied by a service station. Sufficient area is available to provide for an escalator between the control area and the platform. In general the station would be well situated to service a large portion of the residents of Parkchester.

Bronxdale Avenue

Reference to Figure 31 is made. The station at this location will be situated on the railroad embankment north of and above Bronxdale Avenue. This is diagonally opposite the northwest corner of Parkchester Houses. The configuration is of the two track island platform type. The westerly portion of the existing Bronxdale Avenue overpass will require reconstruction to accept the new trackage. A street level control house can be provided under the reconstructed bridge and railroad embankment on the north side of Bronxdale Avenue with an escalator between the control area and the platform. The construction of this station requires the taking of 10 private properties, one along Bronxdale Avenue and 9 along Sacket Avenue.

It is necessary to place the station platform north of Bronxdale Avenue to avoid taking a large supermarket warehouse on a parcel of property presently assessed for approximately 2 million dollars. In general, as with the White Plains Road station, this station would be well situated to service a large portion of the residents of Parkchester.

Eastchester Road

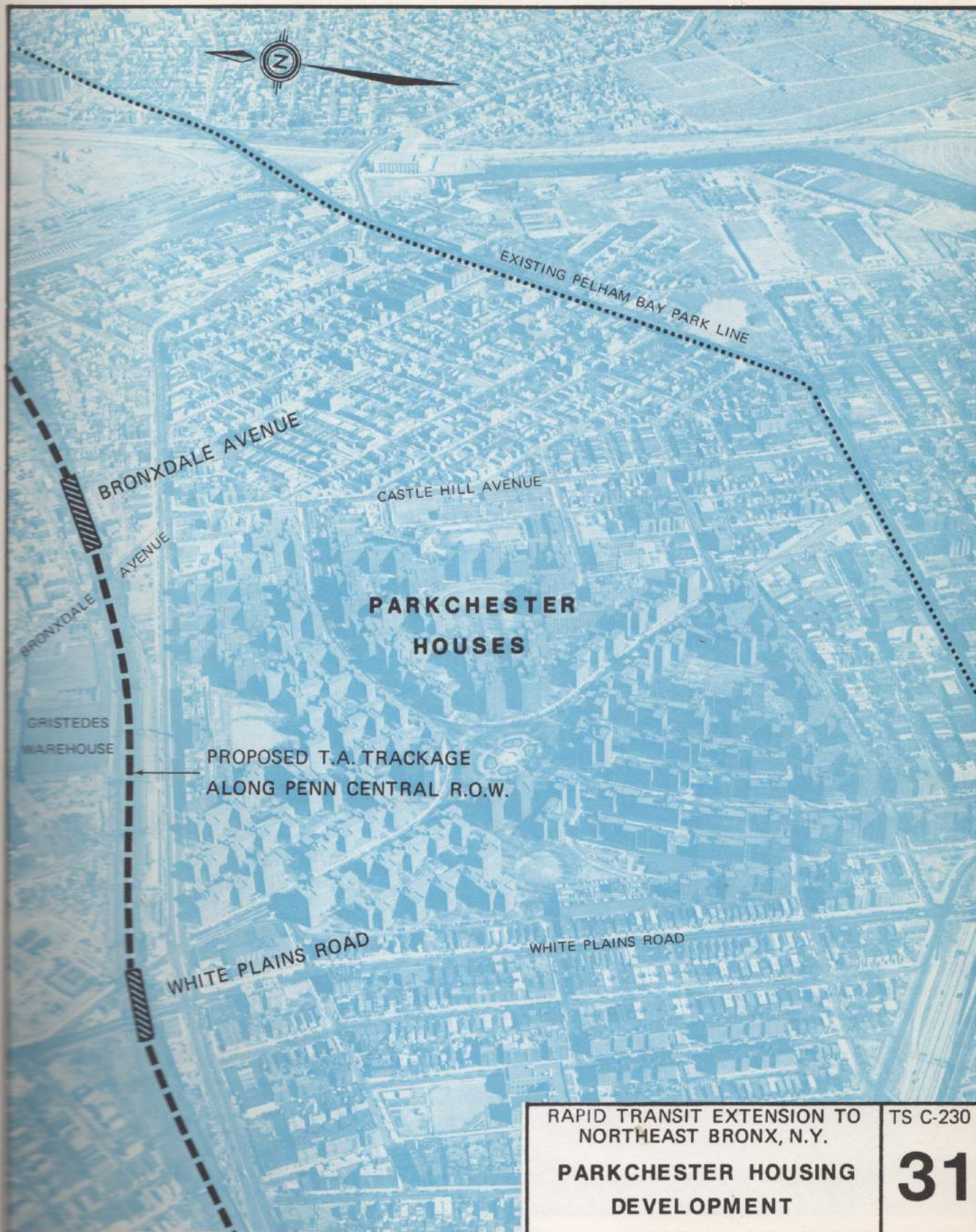
The station at this location will be situated on the railroad embankment north and above Eastchester Road. The configuration is of the two track island platform type. The westerly portion of the existing Eastchester Road overpass will require reconstruction to accept the new trackage. A street level control house can be provided under the reconstructed bridge and railroad embankment on the north side of Eastchester Road with an escalator between the control area and the platform. There are no private properties required to construct this station.

Pelham Parkway

The station at this location will be situated in the railroad cut below Pelham Parkway. The configuration is of the two track island platform type. Two street level control houses will be provided, one each north and south of Pelham Parkway with stairs and escalators provided to the station platforms. The westerly portion of the existing Pelham Parkway bridge will require reconstruction to accommodate the new station and trackage. In addition approximately 600 feet of unused concrete abutment along the westerly edge of the railroad right-of-way will require removal to accommodate the station. One parcel of private property north of Pelham Parkway will require taking in partial fee to accommodate the approach alignment to the station.

Co-op City

Reference to Figure 32 is made. The station at this area will be the terminal for any proposed Transit Authority line along the New Haven right-of-way. Sufficient area is available to place the station adjacent to the south site of Co-op City in the railroad right-of-way south of the Hutchinson River. The station will be of the two track island platform configuration. A diamond crossover will be provided at the south approach for turning trains from northbound to southbound operation. A control area will be located at the north end of the station with access to Ersking Place. No private properties are required for the construction of the station at this location.



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

**PARKCHESTER HOUSING
DEVELOPMENT**

TS C-230

31



RAPID TRANSIT EXTENSION TO NORTHEAST BRONX, N.Y.	
CO-OP CITY	TS C-230
TERMINAL STATION	32

The complete tabulation of private properties required for the construction of any specific proposal will be summarized in Chapter VI.

b. Track

New track will be required for the entire length of the line. The new work will be standard Transit Authority Type VI, which is the typical ballasted track work used on embankments and open cuts. No special requirements or conditions are anticipated since the railroad alignment is of a high standard in this entire corridor.

c. Signals

The entire line will require the installation of a new cab signaling system, again this can be installed and no special requirements or conditions are anticipated.

d. Power

Four new substations will be required to provide third rail traction power to both the northbound and southbound tracks. The substations can be constructed in areas where private property is required for the construction of new stations and at other areas in the railroad right-of-way where excess width is available. No difficulty is anticipated in locating the substations to optimise the power distribution on the line.

e. Line Equipment

All the necessary line equipment can easily be provided. Specifically in between stations, lighting and direct current connections are required. At station areas lighting and all necessary escalator work is to be provided. All the equipment can be installed and no special requirements or conditions are anticipated.

CHAPTER IV

**ALTERNATE CAR STORAGE AND
MAINTENANCE FACILITIES CONSIDERED**

IV. ALTERNATE CAR STORAGE AND MAINTENANCE FACILITIES CONSIDERED

Introduction

The new Second Avenue Subway in Manhattan and its extensions in the Northeast Bronx will require storage and maintenance facilities to accommodate the rolling stock to be used on the line. In order to maximize operations it is required that these facilities be located on large vacant areas adjacent to the new line. This one single requirement eliminates the Borough of Manhattan from any further consideration as a possible location for these facilities. The South Bronx, although it provides several promising sites such as the Harlem River and Oak Point Yards of the Penn Central Railroad, would have to be ruled out because placing these facilities there would result in excessive non revenue car mileage due to the fact that all of the possible terminals of the new line (239th St, Dyre Avenue, Co-op City, Pelham Bay Park) are located at a relatively large distance (approximately 8 miles) from these areas.

In summarizing the above considerations it can be concluded that the requirements for storage and maintenance facilities of the entire Second Avenue Line would have to be incorporated into the scope of this feasibility study, since the only suitable areas for providing for these facilities are located in the Northeast Bronx. In addition they should be located and placed in areas where they do not adversely affect existing Transit Authority facilities and operations and where the impact on the surrounding community will be a minimum.

Analysis of Requirements

As stated in Chapter II two services will originate in the Bronx and operate on the Second Avenue Line in Manhattan. They have been designated by the letters Y and N. Under all proposals the N service will operate from Dyre Avenue and 233rd Street down Second Avenue across the E. 63rd Street Line and on to the existing Broadway Line at 57th Street and 7th Avenue. The Y service depending on the proposal being considered

will originate from either 241st Street and White Plains Road, Co-op City or Pelham Bay Park, down Second Avenue to Whitehall Street in Manhattan.

For the N service the additional operating distance will be approximately 12 route miles or 24 track miles, also it is anticipated that the existing rolling stock of the service South of 57th Street and 7th Avenue will continue to be stored and serviced at Coney Island Yard in Brooklyn. Therefore, it is the additional rolling stock North of 57th Street that will require new facilities in the Northeast Bronx. For the completely new Y service the distance from Whitehall Street to any of the possible terminals in the Northeast Bronx is approximately 16 route miles or 32 track miles. For this service it is required that all the rolling stock be stored and serviced in the Northeast Bronx.

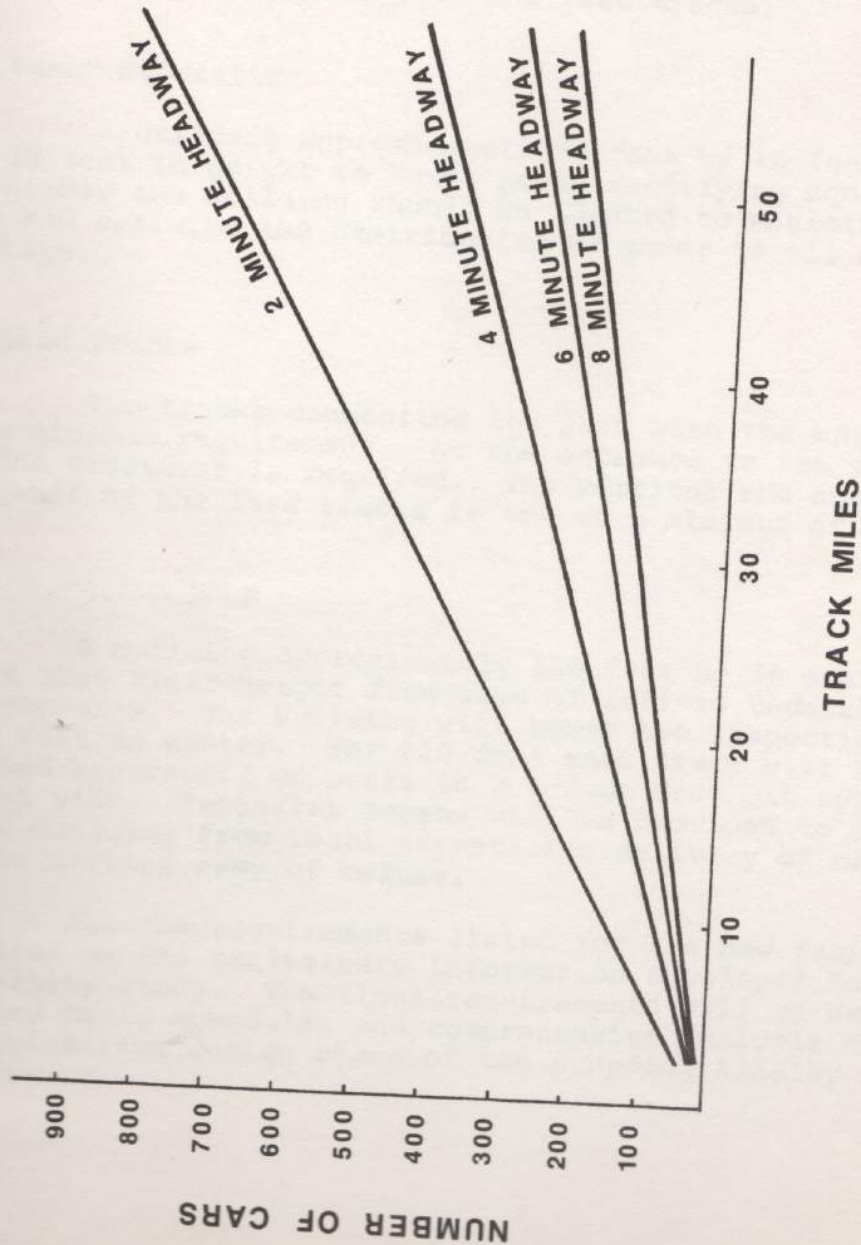
Reference is made to Figure 33. Based on the above mileage and the additional following criteria,

- a. Four minute peak hour headway for each service
- b. Twenty minute "owl" headway for each service
- c. Eight car R-44 type trains
- d. Twenty miles per hour average speed
- e. Three relay trains per service
- f. Ten percent spare factor for each service

the N service requires 25 new 8 car trains and 17 overnight storage tracks and the Y service 30 new 8 car trains and 21 overnight storage tracks.

In addition to overnight storage each service will require separate inspection tracks. Inspections are scheduled for each train on a monthly basis. With a rate of one train per track per day and allowance for some additional capacity, two tracks will be required at each storage location for each of the two services.

Major overhaul facilities are not planned for the Northeast Bronx. It is anticipated that the new rolling stock for the Y and N service will be overhauled at the Coney Island Shops or in a possible new facility in Sunnyside Yard in the Borough of Queens.



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

TRANSIT CARS REQUIRED
VERSUS TRACK MILES

TS C-230

33

In addition to the basic trackage listed a new storage yard would require the following ancillary facilities which would have to be provided to ensure efficient operations and use:

a. Signal Tower and Crew Quarters

A building of approximately 15,000 square feet in floor area with three levels, the topmost level being the control room. Preferably the control room should provide good visibility of the entire yard and lead tracks.

b. Power Substation

A building approximately 90 feet by 40 feet in plan and 30 feet in height to house power rectifying equipment. Preferably the building should be located to minimize duct runs and optimize the distribution of power to all new yard trackage.

c. Lead Tracks

Two tracks connecting the yard with the main line are a minimum requirement. At the entrance to the yard a diamond crossover is required. The vertical and horizontal alignment of the lead tracks is set at a minimum of 15 MPH.

d. Inspection Shop

A building approximately 650 feet by 40 feet in plan and 18 feet clear height from base of rail to underside of roof supports. The building will house two inspection tracks at 20 feet on center. For 610 feet each track will be constructed separately on posts in a 4 foot deep pit approximately 10 feet wide. Vehicular access will be provided to one side of the building from local streets for delivery of materials and the carting away of refuse.

All the requirements listed for the new facilities are based on the preliminary information developed for this feasibility study. The final requirements will be based on detailed train schedules and comprehensive analysis during the engineering design phase of the proposal finally selected.

However, the criteria and information listed is sufficiently accurate to select and study alternate sites and subsequently evaluate the proposals studied in this report.

Alternate Sites Considered

Taken in total the requirements as previously stated would have to occupy approximately 10 acres of plan area in order to be properly integrated to form a well functioning car storage and maintenance facility. The following locations in the Northeast Bronx were selected and studied and found to be the most suitable for consideration as possible sites for the facilities:

- a. The easterly portion of the NYCTA Westchester Yard in the vicinity of Waters Place and Westchester Avenue.
- b. The American Cystoscope Property east of Bassett Avenue in the vicinity of Seminole Street.
- c. The portion of Pelham Bay Park bounded by the New Haven RR, Bruckner Expressway, Shore Road and the Hutchinson River.
- d. The presently vacant area between the north and south sites of Co-op City bounded by the New England Thruway, Bartow Avenue and Hutchinson River Parkway.
- e. The presently vacant area at the North end of the Dyre Avenue Line between the existing Northbound and Southbound operating tracks.
- f. The NYCTA 239th Street Yard at the terminal of the White Plains Road Line in the vicinity of Bissel Avenue.

The basic configuration and the particular features and details of each area are as follows:

Westchester Yard

Westchester Yard is located in the Pelham Bay section of the Bronx adjacent to the NYCTA Pelham Line between

Westchester Square and Middletown Road stations. The Yard has an area of approximately 30 acres and the entire number 6 service (Lexington Avenue Local) is stored and serviced there. On approximately 20 acres storage capacity exists for 479 - 50 foot IRT type cars and an inspection barn with an additional layup capacity of 40 cars. An external car washer is located at the south end together with a loop track which is interconnected with the storage areas. Also at the south end, lead tracks are provided to both the northbound and southbound tracks of the Pelham Line.

The remaining 10 acres east of the car washer loop track are occupied by the NYCTA Maintenance of Way Department and is utilized for storage of track materials and by a large work area where prefabricated track panels are constructed.

Reference to Figure 34 is made. Twenty new storage tracks can be provided between the existing car washer track and the westerly building line of Waters Place. A new 2 track inspection shop can be provided at two alternate locations, one between the car washer track and existing lead tracks, the second adjacent to and west of the existing inspection shop. Ample area is also available for a Signal Tower and Substation building between the existing loop track and Waters Place south of Eastchester Road. Vehicular access is feasible either from Waters Place, Eastchester Road or Westchester Avenue.

Lead tracks can be provided either to the Penn-Central ROW via subway under Waters Place or a direct connection can be made to the existing loop tracks south of Eastchester Road which would provide the new facilities access to the existing yard lead tracks and to the Pelham Bay Park Line.

The existing car storage and maintenance operations would not be affected under any of these proposals, however the maintenance of way track paneling facilities would have to be relocated if any of these proposals were implemented. A possible alternative is the construction of an elevated concrete deck for the new facilities over the present maintenance of way facilities. This was investigated and found feasible, however lead tracks could only be provided to the two Pelham Bay Line Local tracks in the northerly direction and the entire facility would cost approximately \$37 million more than any possible on grade scheme. An incidental benefit is that a deck provides the maintenance of way work

area protection from the elements and therefore increases the amount of time during the year that it is in use.

An additional improvement which can be made for approximately \$2.0 million is the construction, in subway, of a track connection to an existing New Haven RR spur track north of Waters Place. This would greatly facilitate the delivery of equipment and materials from the Penn-Central RR to the yard.

The American Cystoscope Property

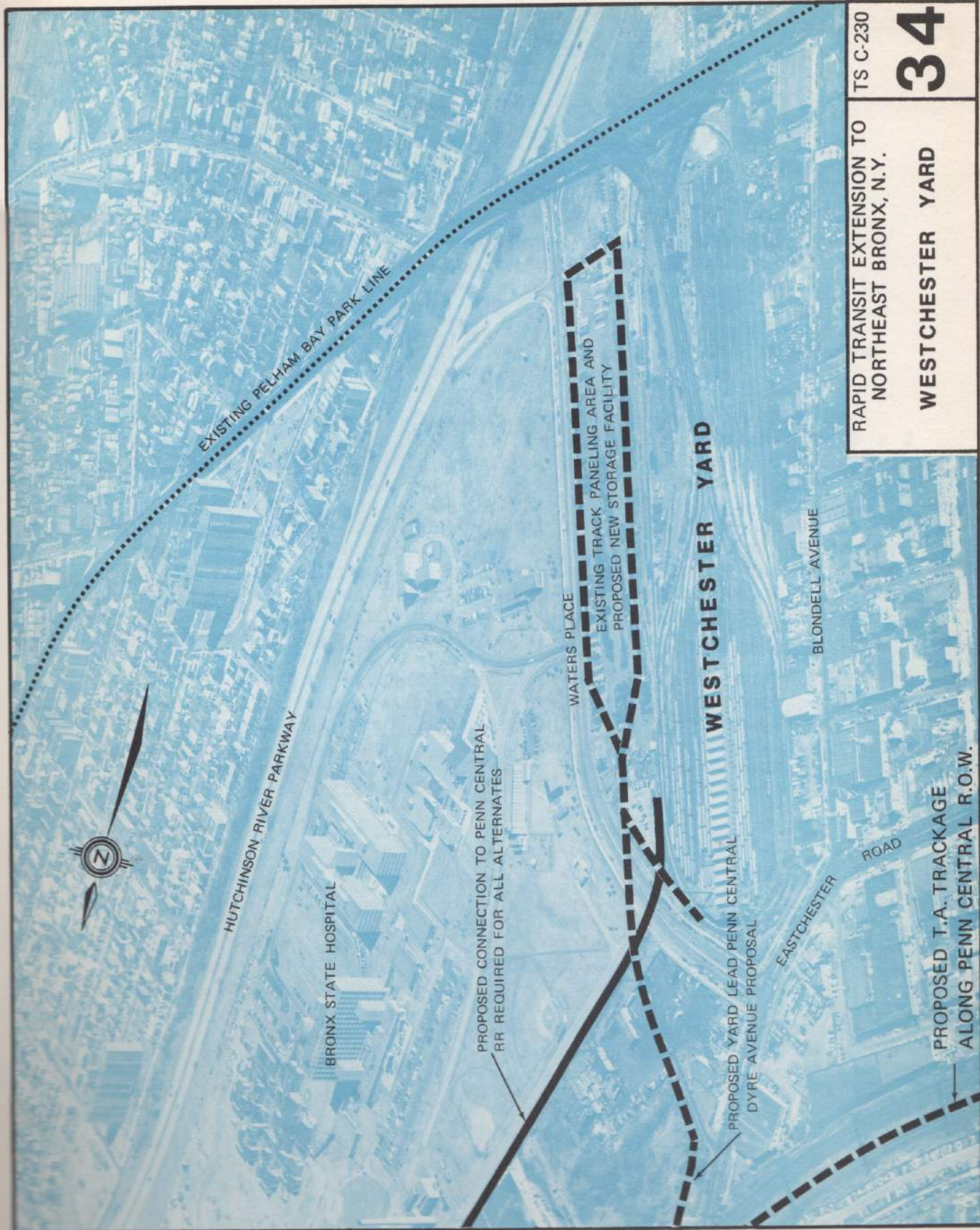
East of the NH ROW between Pelham Parkway and Eastchester Road a parcel of private property (Block 4226 Lot 5) was considered as a possible location for new storage and maintenance facilities. The property is approximately 12 acres in plan area and is owned by The American Cystoscope Company a manufacturer of medical instruments. On the property a large two story building approximately 300,000 square feet in plan area is located.

Reference to Figure 34 is made. Between the New Haven RR and the easterly building line of the property 18 new storage tracks and a new 2 track inspection shed can be provided. With this scheme it would be required to demolish the existing building. Sufficient area would remain at the north end of the property for a new Signal Tower and Substation. Vehicular access would be via the existing private American Cystoscope roadway from Eastchester Road.

Two yard lead tracks could be provided under and across Pelham Parkway and the New Haven RR and then back on grade adjacent to the RR ROW in the vicinity of the Hutchinson River Parkway.

The lead tracks can then be interconnected with any proposed TA trackage along the west side of the New Haven RR ROW.

It does not appear feasible to accommodate a yard and lead track configuration different from that just described, however if given this arrangement the resulting facility would be optimum in combination with any proposal utilizing the Penn-Central ROW for extending the Second Avenue Line in the Northeast Bronx.



RAPID TRANSIT EXTENSION TO NORTHEAST BRONX, N.Y.	TS C-230
	34
WESTCHESTER YARD	

Pelham Bay Park

North of the Bruckner Expressway between the NH ROW, Shore Road and Eastchester Creek a portion of Pelham Bay Park is suitable for additional storage and maintenance facilities. The area is approximately 30 acres of which only some 10 acres would be required. The elevation of the property is near sea level and it can be classified as "wetland" however, it has neither vehicular or pedestrian access and presently is littered throughout with abandoned automobile parts and other miscellaneous refuse.

Reference to Figure 35 is made. Adjacent to and east of the New Haven ROW 20 storage tracks together with a 2 track inspection building can be provided. South of the storage area a Signal Tower and Substation building can be provided. Vehicular access would be north of the storage area via a new roadway connecting to the southbound lanes of Shore Road. The entire area would require approximately 10 feet of fill to bring it up to the elevation of the adjacent New Haven trackage. Additionally the side slopes of the embankment will require heavy rip-rapping to secure it from the tidal effects of Pelham Bay.

Two lead tracks can be provided under and across the Bruckner Expressway and the New Haven RR to any proposed new Transit Authority trackage along the New Haven ROW. In addition a switchback track can be provided south of Bruckner Expressway for access to and from any proposed terminal station (Co-op City), located north of the Bruckner Expressway.

Co-op City

A large tract of vacant land exists between the North and South sites of Co-op City. The property is privately owned and was set aside for commercial development after the construction of the residential portions of Co-op City.

The property is triangular in shape, approximately 50 acres in plan area, and is bounded on three sides by Baychester Avenue on the west, Bartow Avenue on the north and the Hutchinson River Parkway on the east.

Reference to Figure 36 is made. When all the factors are taken into consideration such as the location of the property in relation to Co-op City and the New Haven RR ROW, the requirement for a terminal station in the area and the total requirements of a storage and maintenance facility, the most advantageous arrangement for utilizing the property is as follows.

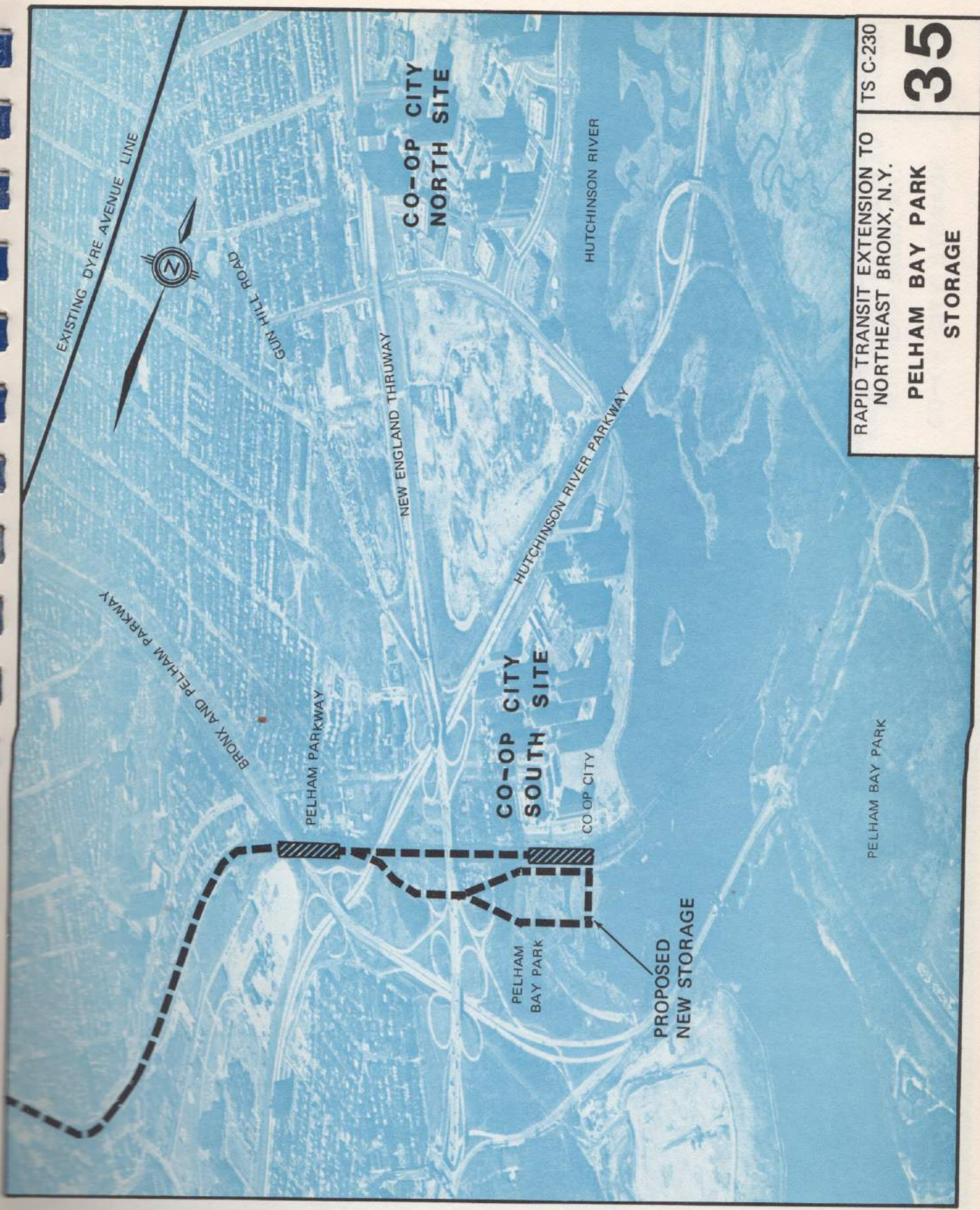
To properly utilize this area any Transit Authority main line trackage along the New Haven would have to be diverted in subway under the New England Thruway and Hutchinson River Parkway then back up on grade extending and ending with a new terminal station adjacent to Bartow Avenue.

On either side of the station 20 storage tracks and a 2 track inspection building would be provided. South of the storage area a Signal Tower and Substation building could be constructed. Also south of the storage area two switchback tracks adjacent to and interconnected with the main line tracks would be provided and for added flexibility of operations they could be connected north of the storage area by a loop track under a proposed station control house fronting Bartow Avenue. Vehicular access could be provided from either Baychester Avenue, Hutchinson River Parkway or Bartow Avenue.

This proposal is unique in that no new lead tracks are required because the main line trackage would function both as operating and as lead tracks. Also the storage tracks, inspection tracks and new terminal station would be located very close together and be well interconnected for a flexible and efficient transit operation.

Dyre Avenue ROW

Reference is made to Figure 39. North of Gun Hill Road station between the operating tracks of the NYCTA Dyre Avenue Line sufficient area is available for two new tracks of sufficient length to provide storage for 18 trains. The new tracks would begin immediately north of Gun Hill Road and extend north for approximately 5000 feet and connect to two existing storage tracks in the vicinity of Hunter Avenue. The existing trackage and diamond crossovers south of the Dyre Avenue Terminal Station would be retained and incorporated into the new storage scheme.



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PELHAM BAY PARK
STORAGE



RAPID TRANSIT EXTENSION TO
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CO-OP CITY STORAGE

At two locations along the storage area single crossovers will be required between the storage tracks and operating tracks. This will subdivide the storage tracks into six, 3 train pocket lengths allowing for flexibility in operations and isolation of any bad order train to a single pocket. (See Figure 40).

North of the terminal two tracks can be provided at 20 feet on center for a sufficient length to provide a suitable inspection shop. This can be accomplished totally within the existing ROW. A Signal Tower and Substation building can be provided adjacent to the shop however, one parcel of private property, Block 4971 Lot 50, will be required. This property is presently vacant and its taking would not require the relocation of residents or commercial establishments. Vehicular access to the Substation, Signal Tower and Inspection Shop would be via 233rd Street and Merritt Avenue.

E. 239th Street Yard

The E. 239th Street Yard is located in the Wakefield section of the Bronx adjacent to the NYCTA White Plains Road Line between E. 241st Street and E. 238th Street stations. The yard has an area of approximately 25 acres. Presently the number 2 service (7th Avenue Express) and the number 5 service (Lexington Avenue Express) are stored there. On the westerly portion of the yard storage capacity exists for 500-50 foot IRT type cars and an inspection barn with an additional layup capacity for 80 cars. Lead tracks are located around the periphery of the yard and connect to the White Plains Road Line in the vicinity of E. 239th Street. At the southeast end of the yard an external car washer is located which is connected to the lead tracks.

A relatively large area between the storage and loop tracks exists and is presently being utilized as a temporary depository for retired NYCTA surface transit vehicles.

Reference to Figure 37 is made. The existing storage area can be modified to provide for 20 new storage tracks each accommodating one 8 car 600 foot length train. The existing inspection barn can be extended approximately 60 feet in the northerly direction together with internal modifications to provide new inspection facilities. The existing lead tracks and external car washer can remain essentially intact and be incorporated into the new yard facilities.

Between the lead and storage tracks ample area exists for a new Substation and Signal Tower. Vehicular access to the yard would be via E. 241st St.

A possible alternative is the construction of an elevated concrete deck for the new facilities over the existing yard. This can be accomplished with a single ended Y type yard arrangement set in an east-west direction with lead tracks connecting to the White Plains Road Line south of the E. 241st station. This scheme would have the advantage of permitting the existing yard to remain an IRT facility, however it would cost approximately \$42 million more than any equivalent on grade facility.

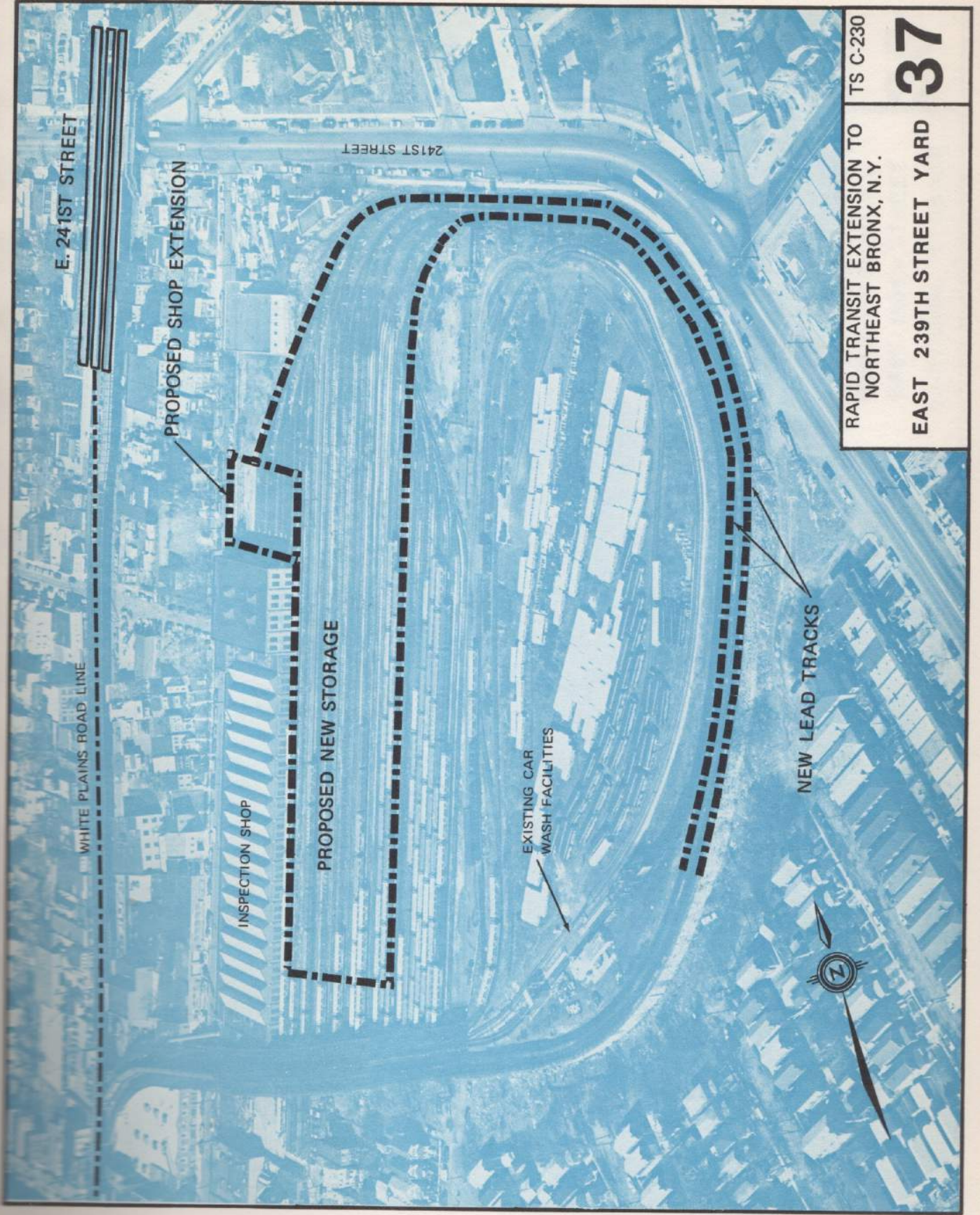
An additional improvement which can be made in conjunction with the utilization of the 239th St. yard is the construction of new IRT storage at E. 180th St. Reference to Figure 38 is made. North of the Bronx River Parkway, entirely on Transit Authority property, between the Dyre Avenue Line and the White Plains Road Line it is possible by constructing new tracks and utilizing existing tracks to provide storage for 80 IRT type cars. This would offset in part the loss of IRT storage at 239th St. The cost of this would be minimal, approximately \$5 million, since all the construction would be on grade and on Transit Authority property.

Summary of Proposals

In summarizing the storage proposals in the Northeast Bronx it appears that they fall into two basic categories. The first is those proposals requiring large parcels of private or park property and the second is those proposals which require existing Transit Authority property with subsequent significant impact on existing Transit facilities.

It can also be stated that utilizing all the alternatives considered in this Chapter it is possible to provide storage and maintenance facilities for any proposal of extending the Second Avenue Line in the Northeast Bronx.

The specific configuration of storage and maintenance schemes required for any alternative, will be outlined in Chapter V. The evaluation, analysis, discussion of merits and deficiencies of each will be made in Chapter VII.



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EAST 239TH STREET YARD



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RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

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EAST 180TH STREET
ADDITIONAL STORAGE

CHAPTER V

V. ALTERNATE PROPOSALS STUDIED

INTRODUCTION

The two transit corridors considered in Chapter IV and the alternate storage and distribution areas outlined in Chapter IV are all indicated diagrammatically on Figure 10. These corridors and areas are outlined and labeled in question 1 and 2 of the second section below the Northwest Corridor. However, for each corridor, which will subsequently be considered, the following three proposals were submitted for detailed study and evaluation.

1. A proposal which will extend the new line along the new Central right-of-way to S. 174th Street, then extending north along the shadowed corridor and terminating railroad right-of-way at S. 140th Street. Where a new line is to be built with the new line and the new line and line will then be built, new storage and distribution facilities will be provided at that point. The new line will be provided at that point. The new line will be provided at that point.

2. A proposal which will extend the new line along the new Central right-of-way to S. 174th Street, then extending north along the shadowed corridor and terminating railroad right-of-way at S. 140th Street. Where a new line is to be built with the new line and the new line and line will then be built, new storage and distribution facilities will be provided at that point. The new line will be provided at that point.

3. A proposal which will extend the new line along the new Central right-of-way to a point north of the new line and then extending north along the shadowed corridor and terminating railroad right-of-way at S. 140th Street. Where a new line is to be built with the new line and the new line and line will then be built, new storage and distribution facilities will be provided at that point. The new line will be provided at that point.

ALTERNATE PROPOSALS STUDIED

V. ALTERNATE PROPOSALS STUDIED

Introduction

The four transit corridors considered in Chapter III and the alternate car storage and maintenance areas outlined in Chapter IV are all indicated diagrammatically on Figure 39. These corridors and areas can be combined and utilized in numerous ways for extending the Second Avenue Line into the Northeast Bronx. However, for many reasons, which will subsequently be enumerated, the following three proposals were selected for detailed study and evaluation.

1. A proposal which will extend the new line along the Penn Central right-of-way to E. 174th Street, then extending north along the abandoned Boston and Westchester railroad right-of-way to E. 180th Street, where a connection is made to both the Dyre Avenue and White Plains Road Lines. With this proposal, car storage and maintenance facilities will be provided at 239th Street yard and at the north end of the Dyre Avenue Line right-of-way. Reference to Figure 40, is made.
2. A proposal which will extend the new line along the Penn Central right-of-way to E. 174th Street, then extending north along the abandoned Boston and Westchester railroad right-of-way to E. 180th Street where a connection is made to the Dyre Avenue Line. In addition, in the vicinity of Longwood Avenue, two tracks diverge and extend in subway under Bruckner Boulevard to the vicinity of Aldous Street where a connection is made to the Pelham Bay Park Line. With this proposal car storage and maintenance facilities will be provided at Westchester Yard and at the north end of the Dyre Avenue Line right-of-way. Reference to Figure 41, is made.
3. A proposal which will extend the new line along the Penn Central right-of-way to a point south of the Hutchinson River adjacent to the south site of Co-op City. In addition in the vicinity of E. 174th Street two tracks diverge, then extend north along the abandoned Boston and Westchester railroad right-of-way to E. 180th Street

where a connection is made to the Dyre Avenue Line. With this proposal car storage and maintenance facilities will be provided at Westchester Yard and at the north end of the Dyre Avenue Line right-of-way. Reference to Figure 42, is made.

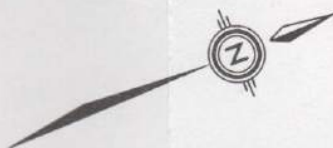
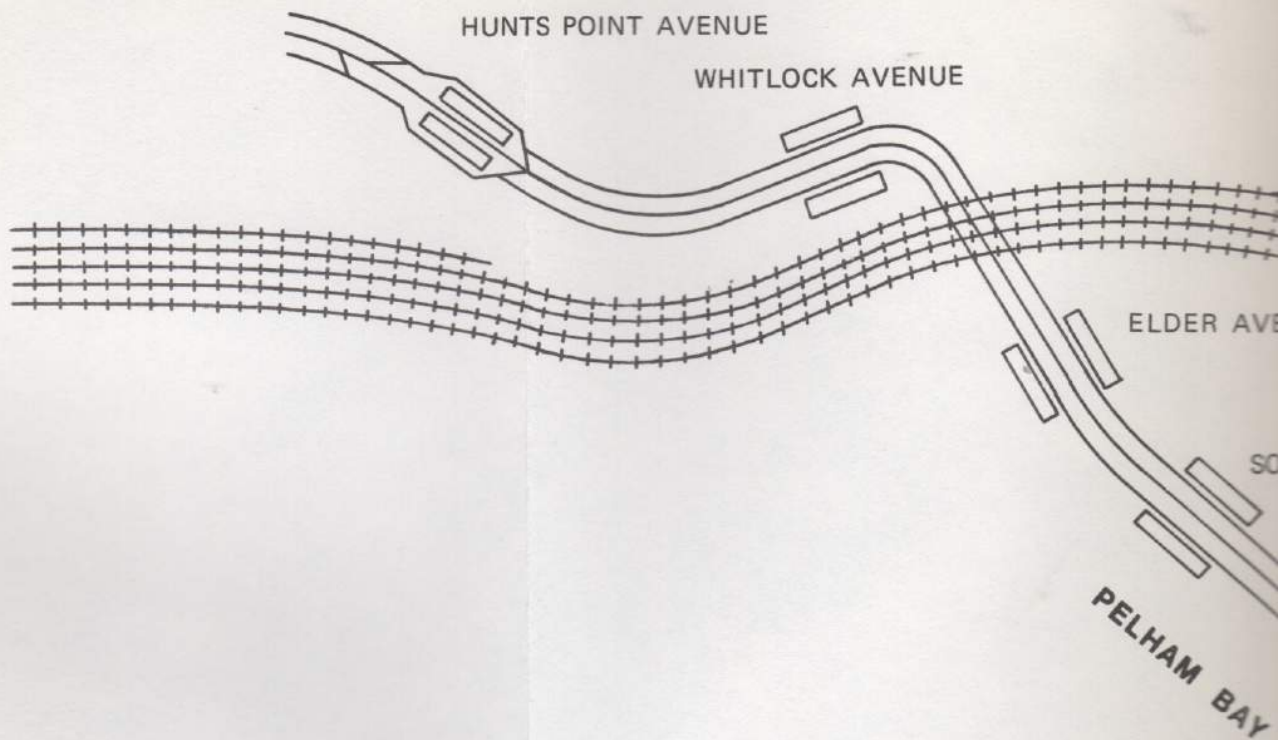
It can be seen that all three proposals selected for detail study have the following basic feature in common;

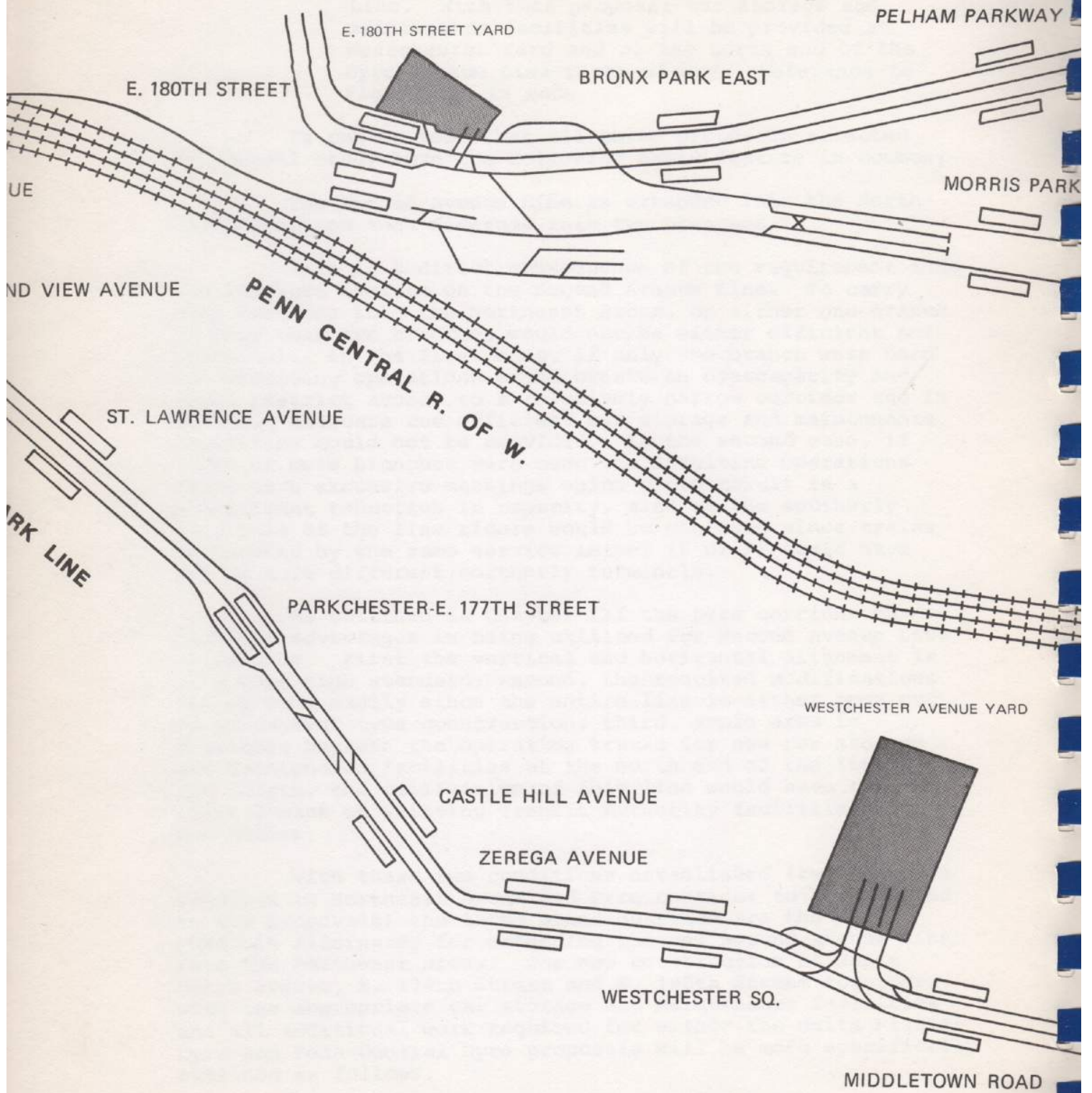
The Second Avenue Line is extended into the Northeast Bronx and then diverges into two branches.

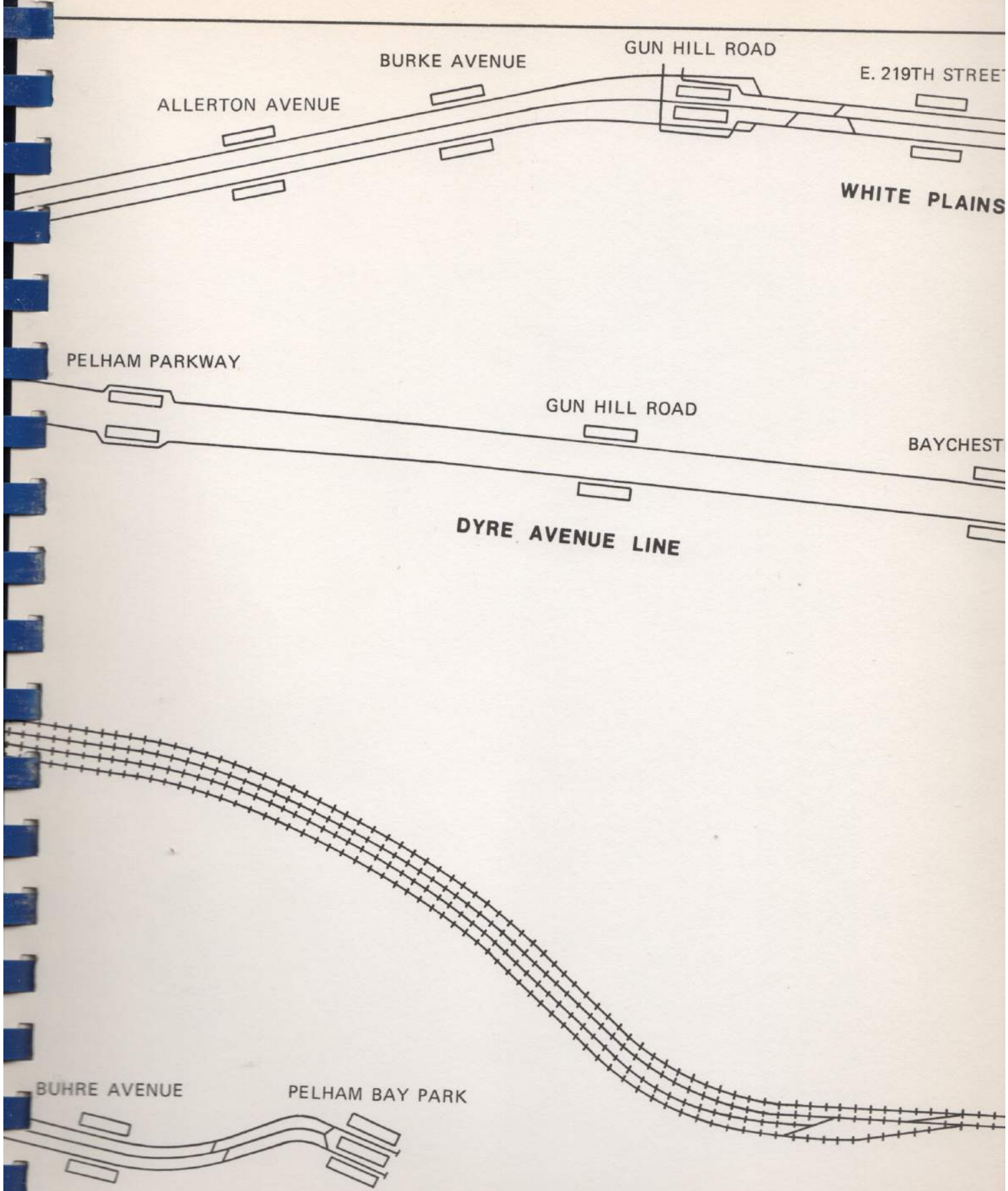
This is a direct consequence of the requirement that two services operate on the Second Avenue Line. To carry both services into the Northeast Bronx, on either one branch or more than two branches would not be either efficient nor practical. In the first case, if only one branch were used the resulting operations would create an overcapacity and would restrict access to a relatively narrow corridor and in addition adequate and efficient car storage and maintenance facilities could not be provided. In the second case, if three or more branches were used the resulting operations would have excessive meshings which would result in a significant reduction in capacity, also at the southerly terminals of the line riders would be confused since trains designated by the same service letter (Y or N) could have two or more different northerly terminals.

As outlined in Chapter III the Dyre corridor has numerous advantages in being utilized for Second Avenue Line operations. First the vertical and horizontal alignment is of a very high standard; second, the required modifications can be made easily since the entire line is either open cut or embankment type construction; third, ample area is available between the operating tracks for new car storage and maintenance facilities at the north end of the line and fourth, the utilization of this line would have the least impact on existing Transit Authority facilities and operations.

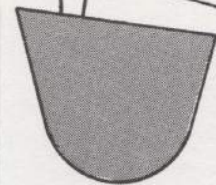
With these two conditions established (two branches required in Northeast Bronx and Dyre corridor to be utilized in all proposals) the three plans outlined are the only possible alternates for extending the new Second Avenue Line into the Northeast Bronx. The new construction at Hunts Point Avenue, E. 174th Street and E. 180th Street together with the appropriate car storage and maintenance facilities and all additional work required for either the White Plains-Dyre and Penn-Central Dyre proposals will be more specifically outlined as follows.







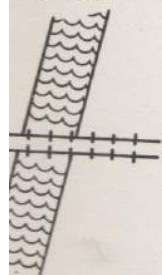
25TH STREET
 E. 233RD STREET
 E. 238TH STREET
 E. 241ST STREET
 D LINE



E. 239TH STREET YARD

ENUE
 DYRE AVENUE

JTCHINSON RIVER



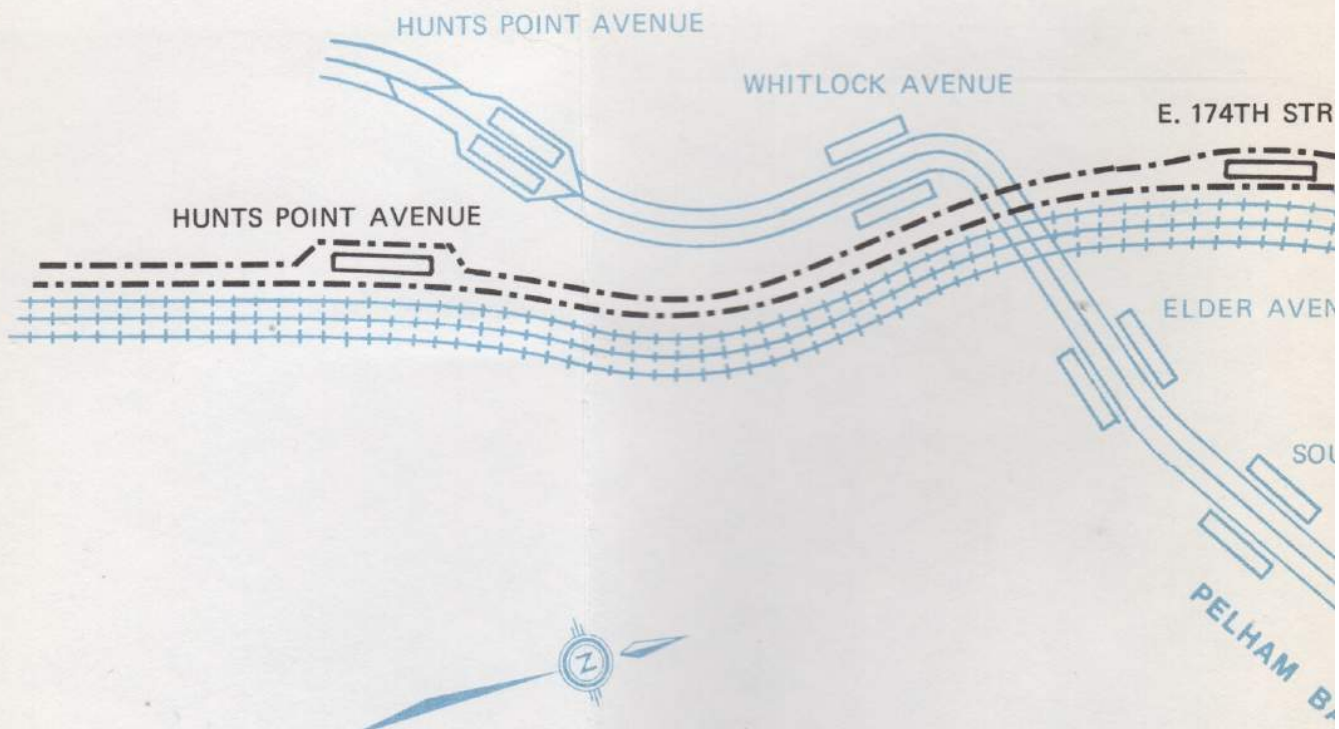
RAPID TRANSIT EXTENSION TO
 NORTHEAST BRONX, N.Y.

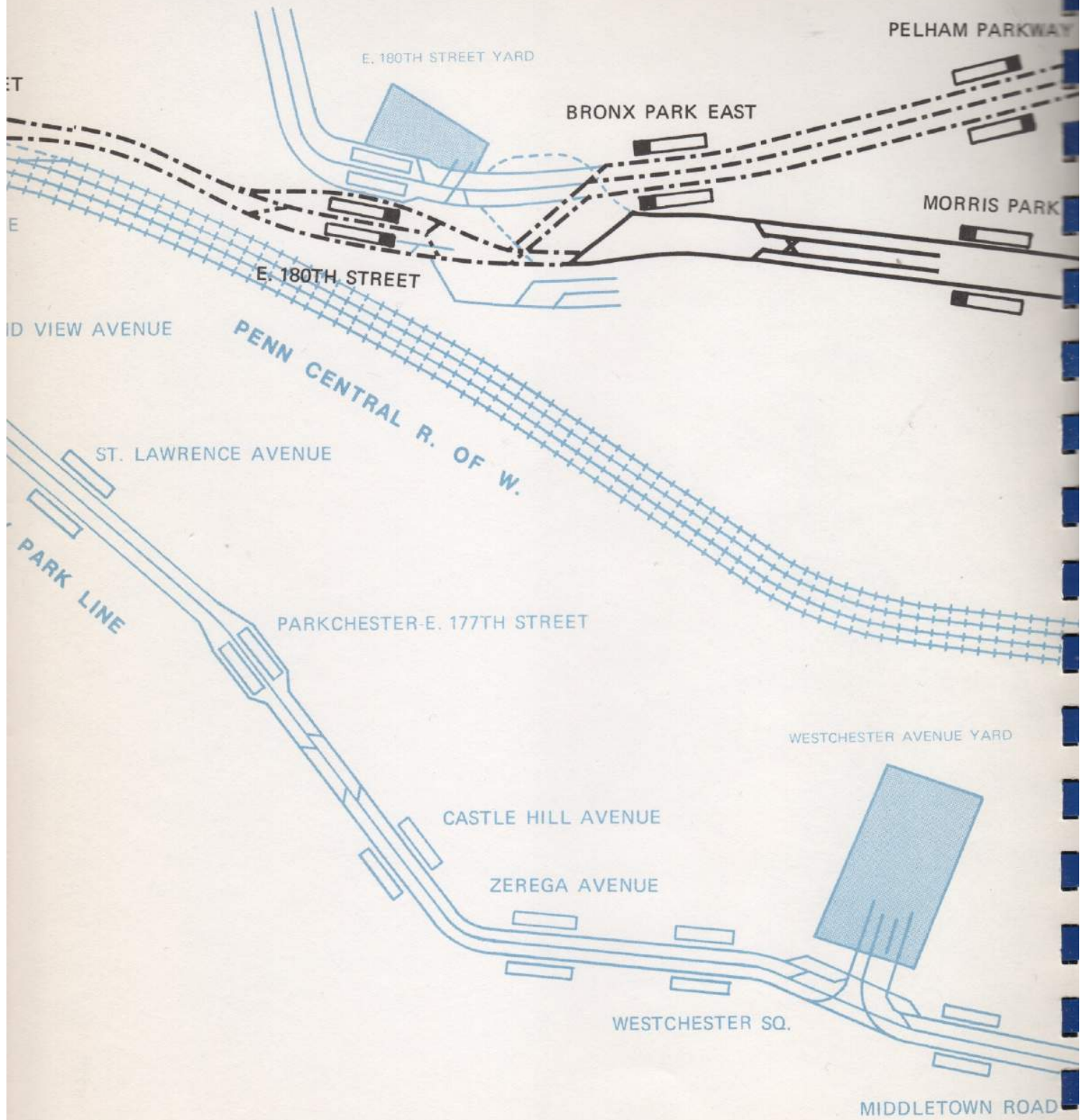
DIAGRAMATIC
 EXISTING TRACKAGE
 EXISTING TRACKAGE

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39







BURKE AVENUE

GUN HILL ROAD

E. 219TH STREET

E. 225TH STREET

ALLERTON AVENUE

WHITE PLAINS ROAD

PELHAM PARKWAY

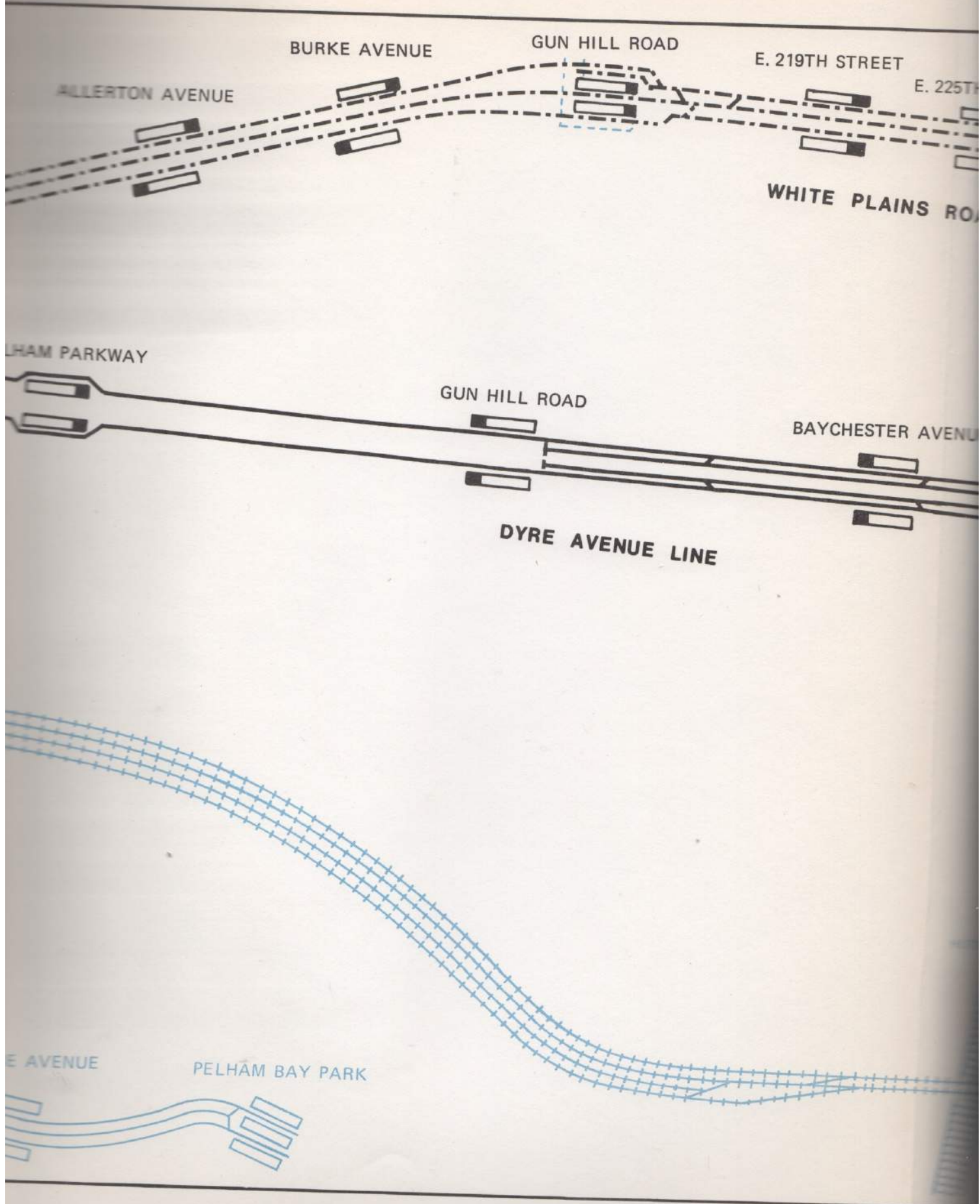
GUN HILL ROAD

BAYCHESTER AVENUE

DYRE AVENUE LINE

E AVENUE

PELHAM BAY PARK



TH STREET
E. 223RD STREET
E. 238TH STREET
E. 241ST STREET
OAD LINE

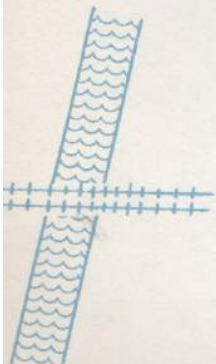


E. 239TH STREET YARD

NUE
DYRE AVENUE

A diagram showing a section of Dyre Avenue. It consists of two parallel lines representing the road, with a small rectangular structure (possibly a building or station) located between them. The road is labeled 'DYRE AVENUE' and 'NUE'.

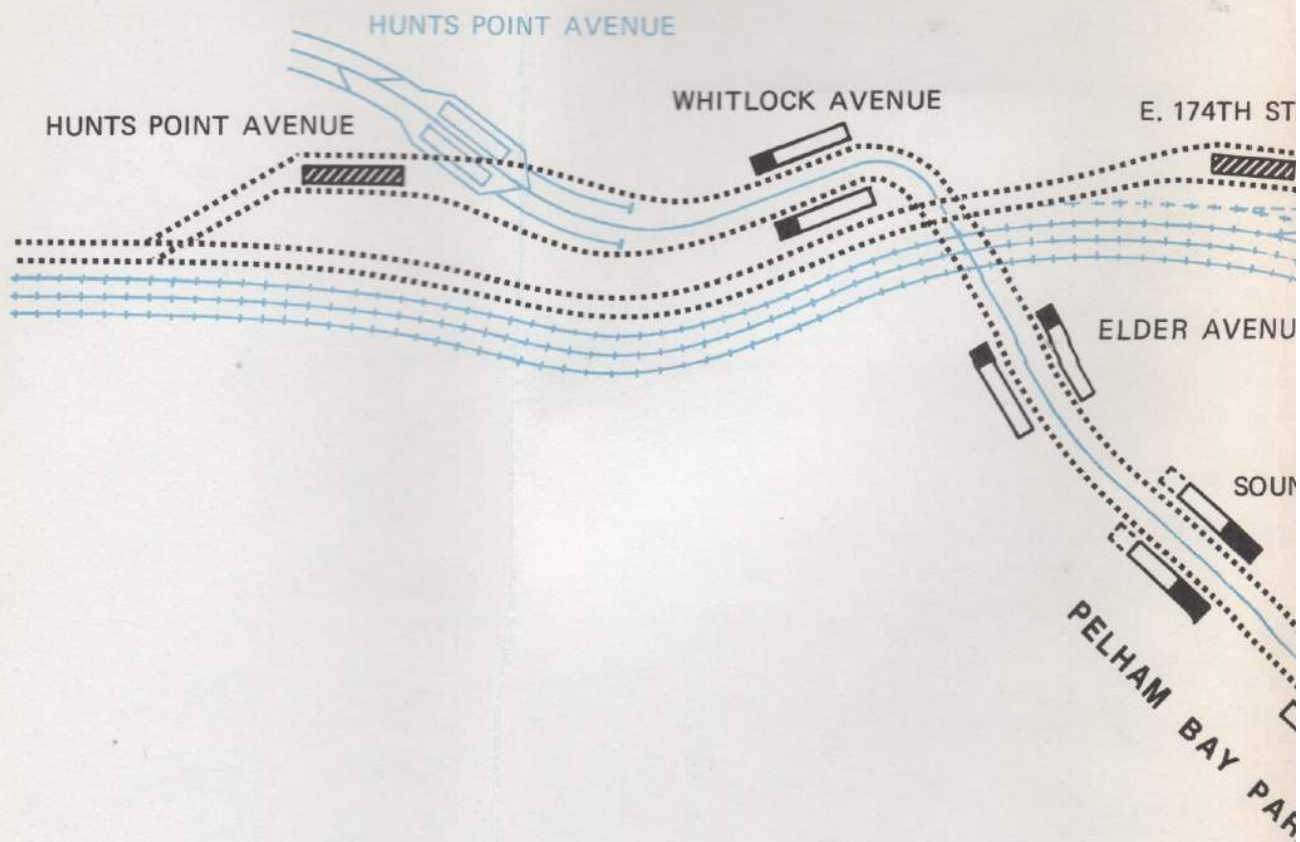
HUTCHINSON RIVER



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
DIAGRAMATIC
WHITE PLAINS
DYRE PROPOSAL

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EET

E. 180TH STREET YARD

PELHAM PARKWAY

E. 180TH STREET

BRONX PARK EAST

MORRIS PARK

D VIEW AVENUE

PENN CENTRAL R. OF W.

ST. LAWRENCE AVENUE

ARK LINE

PARKCHESTER-E. 177TH STREET

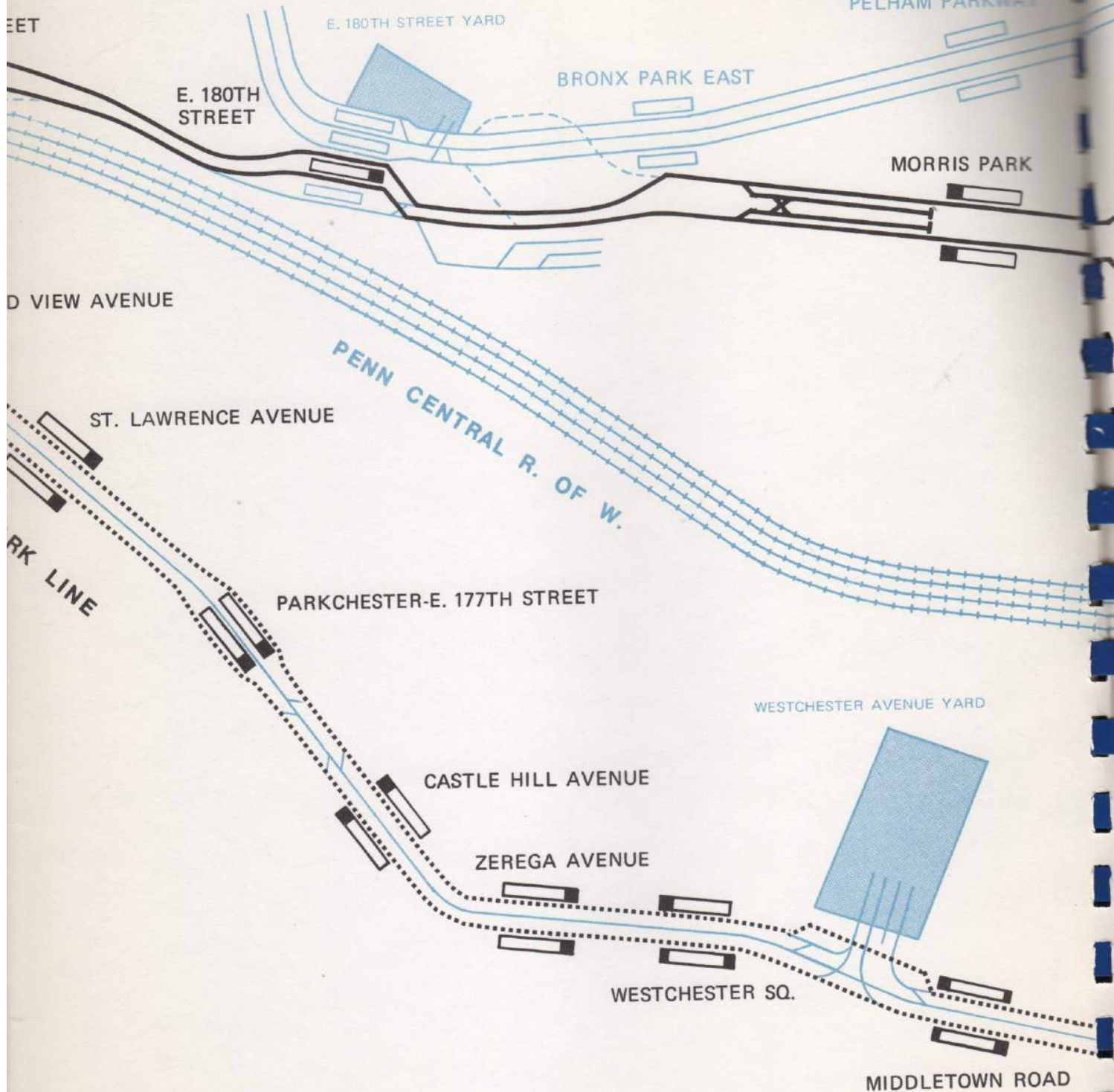
WESTCHESTER AVENUE YARD

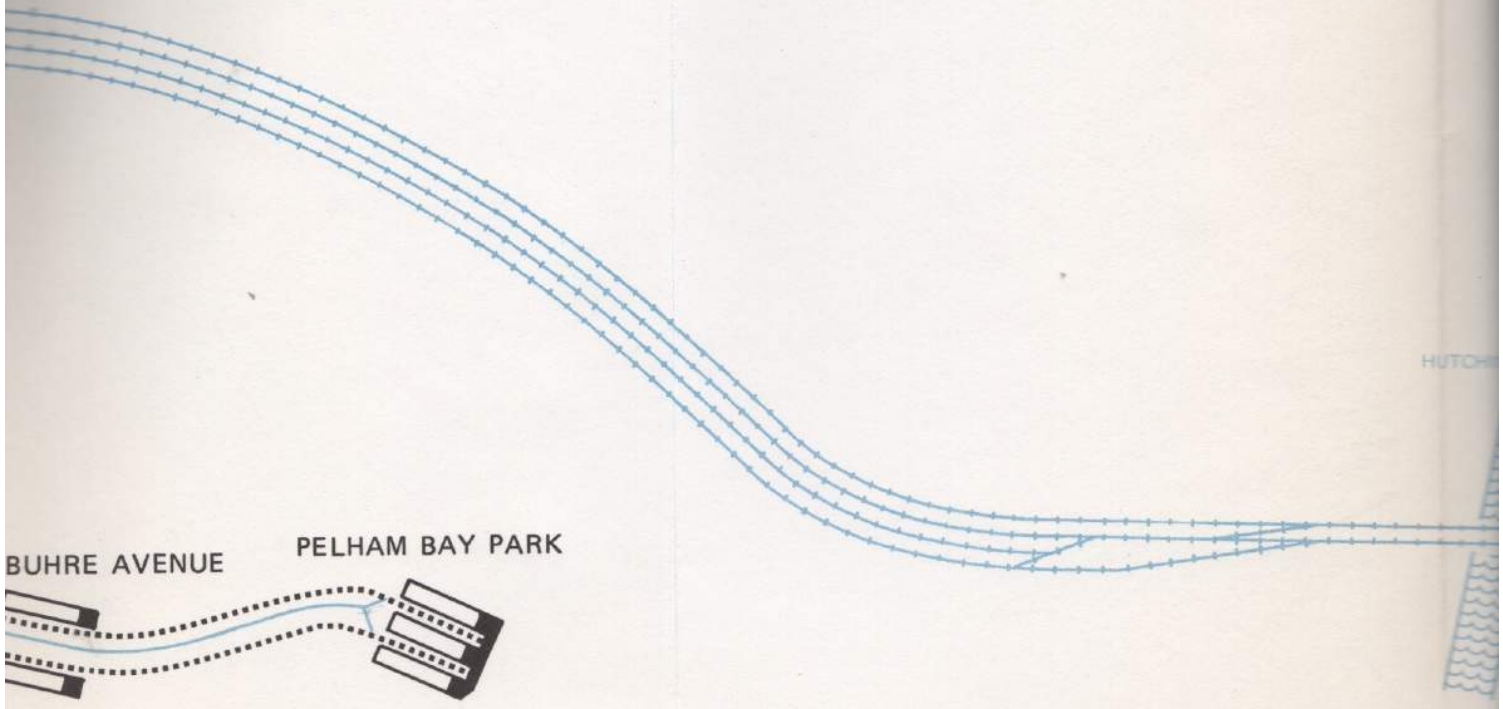
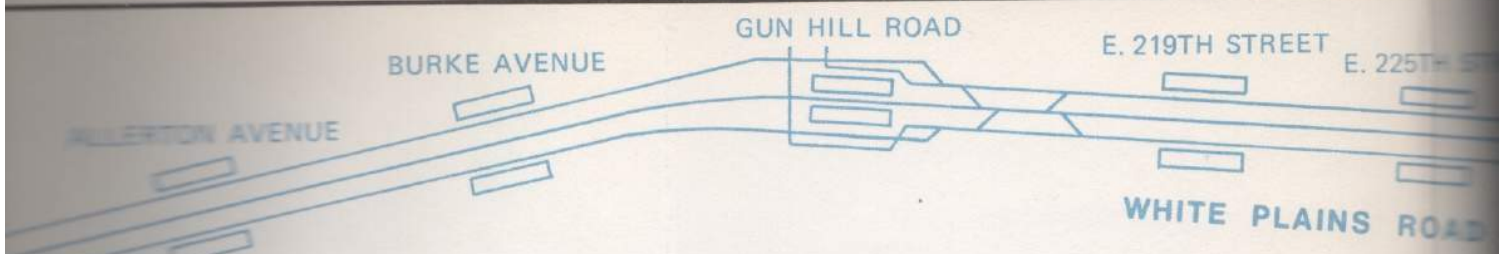
CASTLE HILL AVENUE

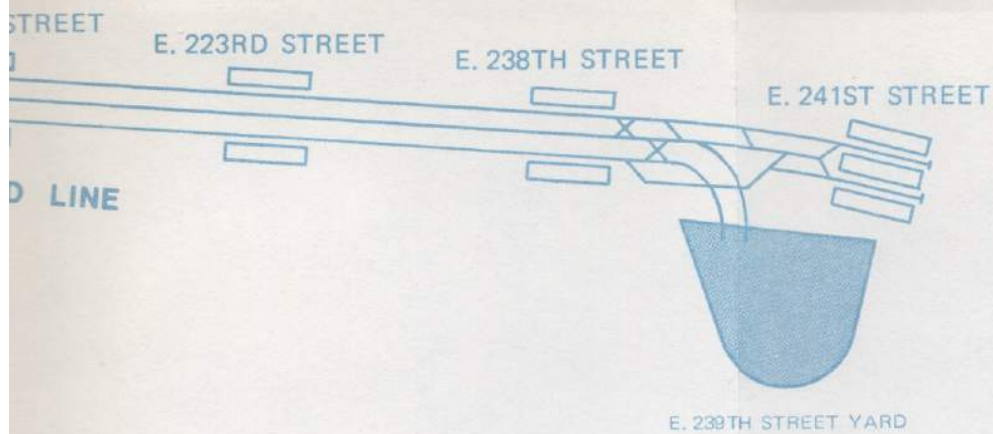
ZEREGA AVENUE

WESTCHESTER SQ.

MIDDLETOWN ROAD

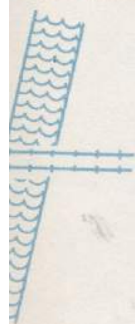






DYRE AVENUE

HINSON RIVER

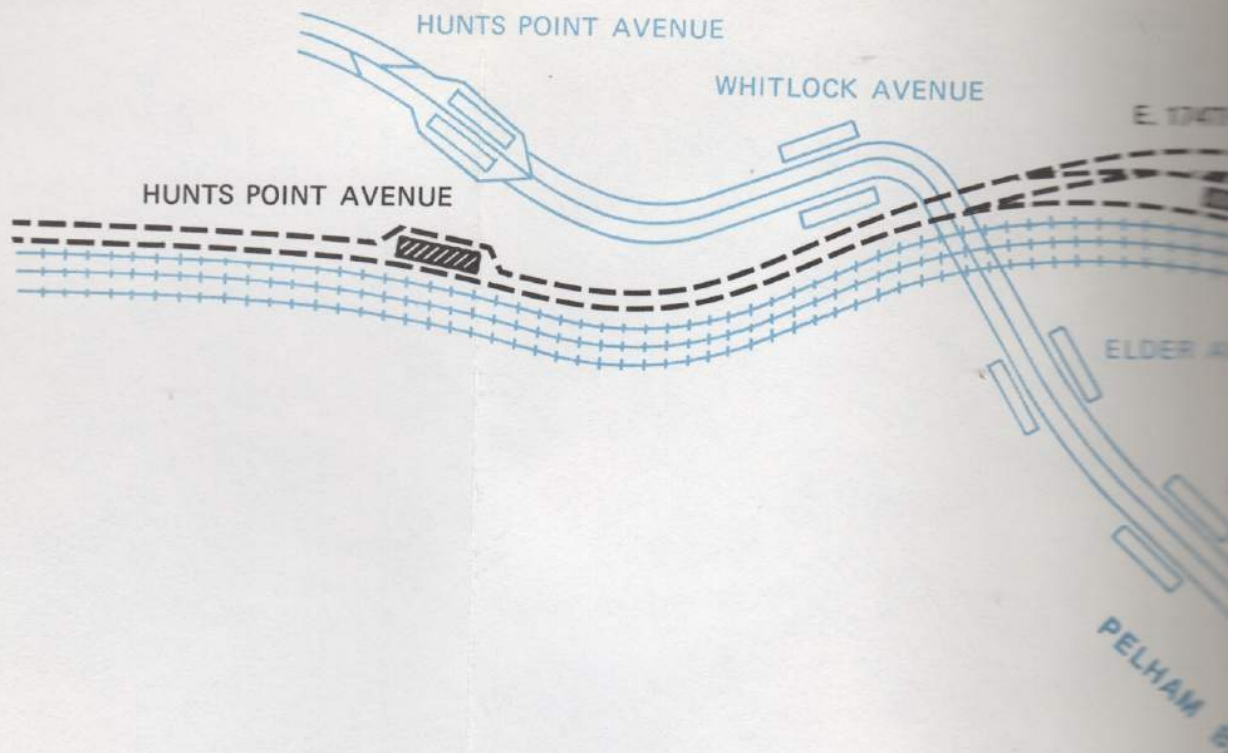


RAPID TRANSIT EXTENSION TO
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DIAGRAMATIC
PELHAM DYRE PROPOSAL

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174TH STREET

E. 180TH STREET YARD

E. 180TH STREET

BRONX PARK EAST

PELHAM PARK

R AVENUE

MORRIS PARK

SOUND VIEW AVENUE

WHITE PLAINS ROAD

PENN CENTRAL R. OF W.

ST. LAWRENCE AVENUE

BRONXDALE AVENUE

EASTCHESTER ROAD

PARKCHESTER-E. 177TH STREET

WESTCHESTER AVENUE YARD

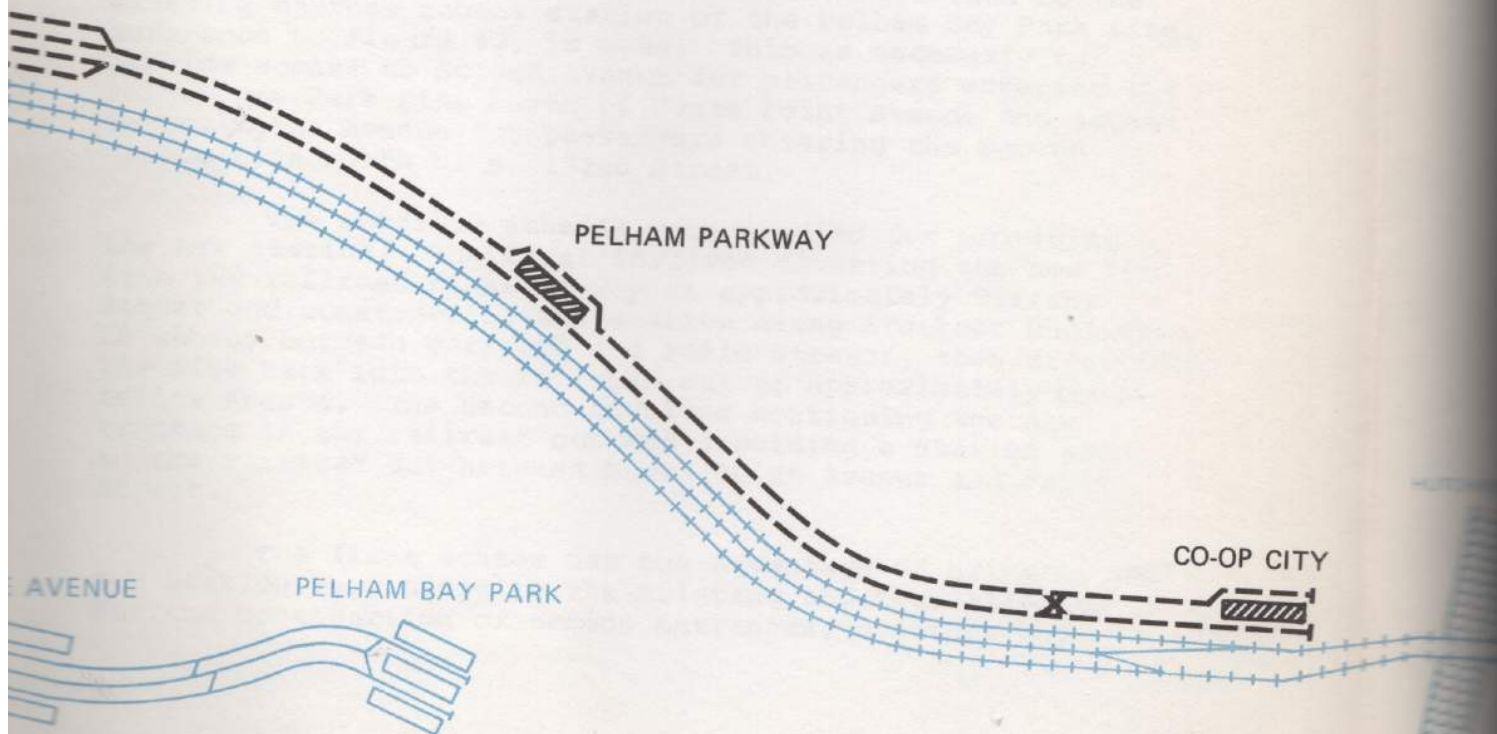
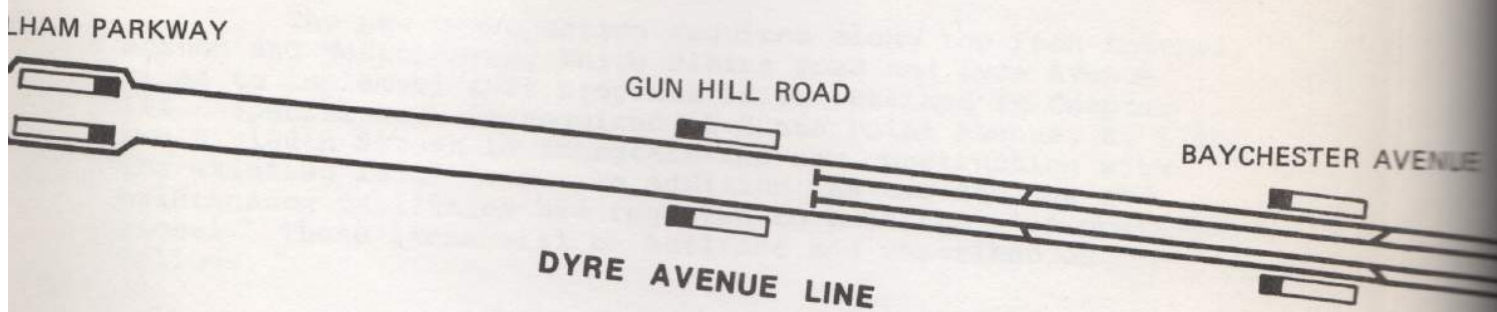
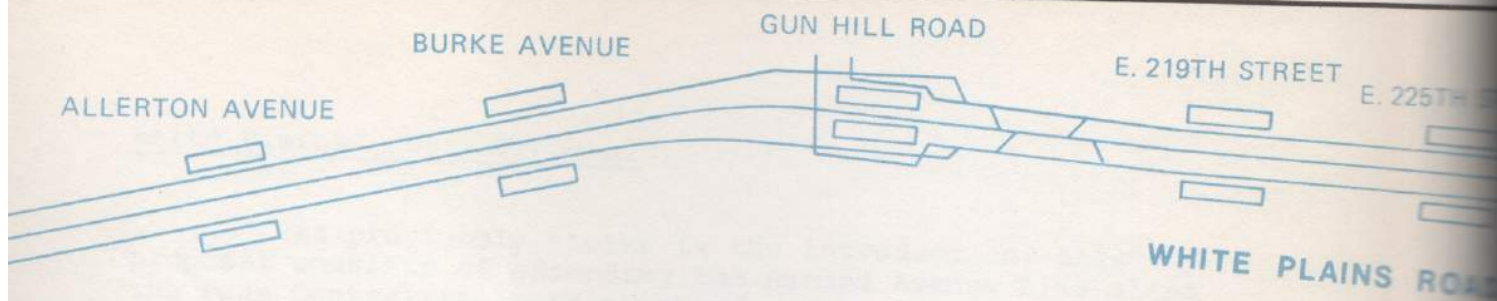
CASTLE HILL AVENUE

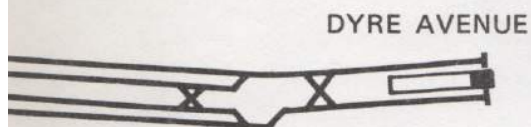
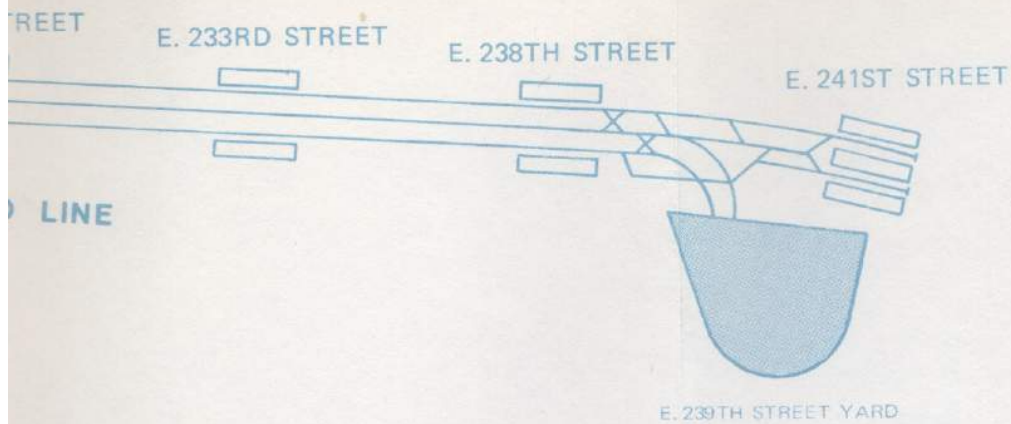
ZEREGA AVENUE

WESTCHESTER SQ.

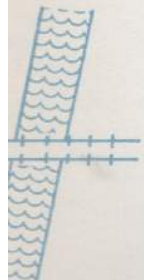
MIDDLETOWN ROAD

BAY PARK LINE





ROBINSON RIVER



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
DIAGRAMATIC
PENN CENTRAL
DYRE PROPOSAL

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White Plains - Dyre Proposal

As previously stated in the introduction, this proposal consists of extending the Second Avenue Line along the Penn Central railroad right-of-way to E. 174th Street, then north along the abandoned Boston and Westchester railroad right-of-way to E. 180th Street where a connection is made to both the Dyre Avenue and White Plains Road Line local tracks.

The new construction required along the Penn Central, Boston and Westchester, White Plains Road and Dyre Avenue Lines to implement this proposal is as outlined in Chapter III. Special work is required at Hunts Point Avenue, E. 174th and E. 180th Street to integrate the new construction with the existing facilities. In addition new car storage and maintenance facilities are required to make the plan operational. These items will be outlined and described as follows.

a. Hunts Point Avenue

At this location as the Second Avenue Line enters the study area along the Penn Central railroad right-of-way, a new station is required with transfer facilities to the existing express subway station of the Pelham Bay Park Line. Reference to Figure 43, is made. This is necessary to provide access to Second Avenue for passengers entering the Pelham Bay Park Line north of Hunts Point Avenue and access to Lexington Avenue for passengers entering the Second Avenue Line north of E. 172nd Street.

Two separate schemes were studied for providing the new station. The first involves diverting the new line from the railroad right-of-way at approximately Tiffany Street and constructing the station along Bruckner Boulevard in subway between Barretto and Faile Streets, then diverting the line back into the railroad cut at approximately Longfellow Avenue. The second involves continuing the new trackage in the railroad cut and providing a station also in the railroad cut between Hunts Point Avenue and Faile Street.

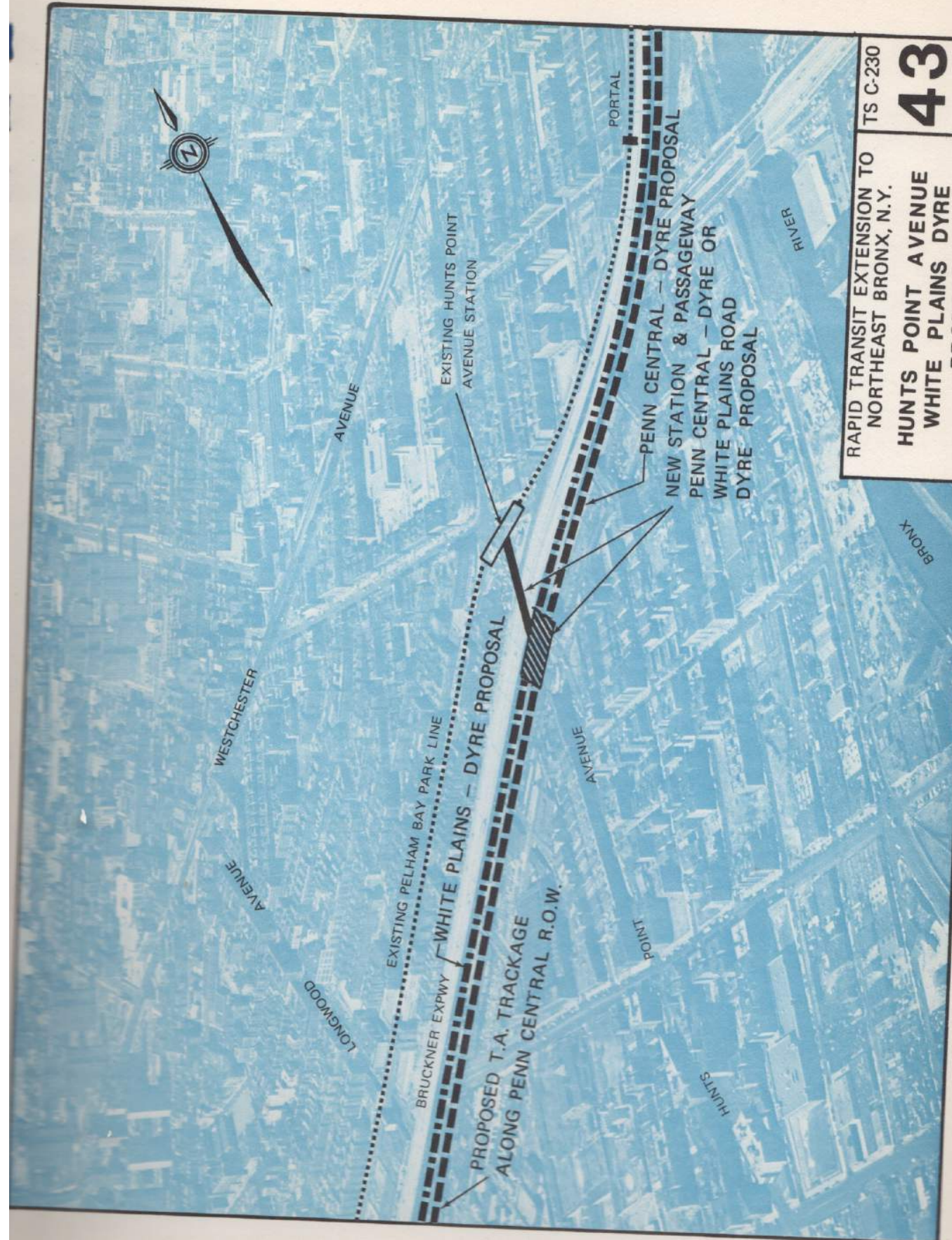
The first scheme has the advantage of bringing the new station very close to the existing and thus allowing for the construction of common entrances, controls and

transfer facilities. However, it would cost approximately \$37 million more than the second scheme and in addition its construction would require massive underpinning of the Bruckner elevated expressway between Tiffany Street and Longfellow Avenue. Because of this high cost and the severe impact the construction would have on the surrounding area this plan cannot be justified.

The station in the railroad right-of-way is recommended and made part of the White Plains-Dyre Proposal. Reference to Figure 43, and Figure 44, is made. The new station in the railroad cut is of the two track island configuration type. Sufficient width exists for the proper lateral clearances to be provided between the Transit Authority facilities and the existing Penn Central trackage after the removal of the westerly Penn Central track as outlined in Chapter III. A new control house can be provided for revenue passengers at the street level, however this will require the removal of three business establishments utilizing the existing structure, which was a former railroad control house, and is now leased by the Penn Central for commercial purposes.

A new subway passage can be provided for transferring passengers. At the new station it will be located below the new control house with separate stairs and escalators to the station platform thus completely segregating the revenue and transferring passengers. At the existing underground control area located below the pedestrian island between E. 163rd Street and Hunts Point Avenue, rearrangement and replacement of existing controls will be required to accommodate the new passageway, this can be provided for without any difficulty.

The proposed passageway will be approximately 350 feet long, however it will have a straight alignment and only a slight difference in elevation between its ends. If made sufficiently wide and given good architectural treatment it should not deter transfers between the two lines. Precedent for this does exist on the system with an existing passageway of approximately equal length between the Flushing and Sixth Avenue Lines. From the date of its opening in August 1971, it has been well accepted by the public and at the present it is very heavily used.



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

**HUNTS POINT AVENUE
WHITE PLAINS DYRE
PROPOSAL**

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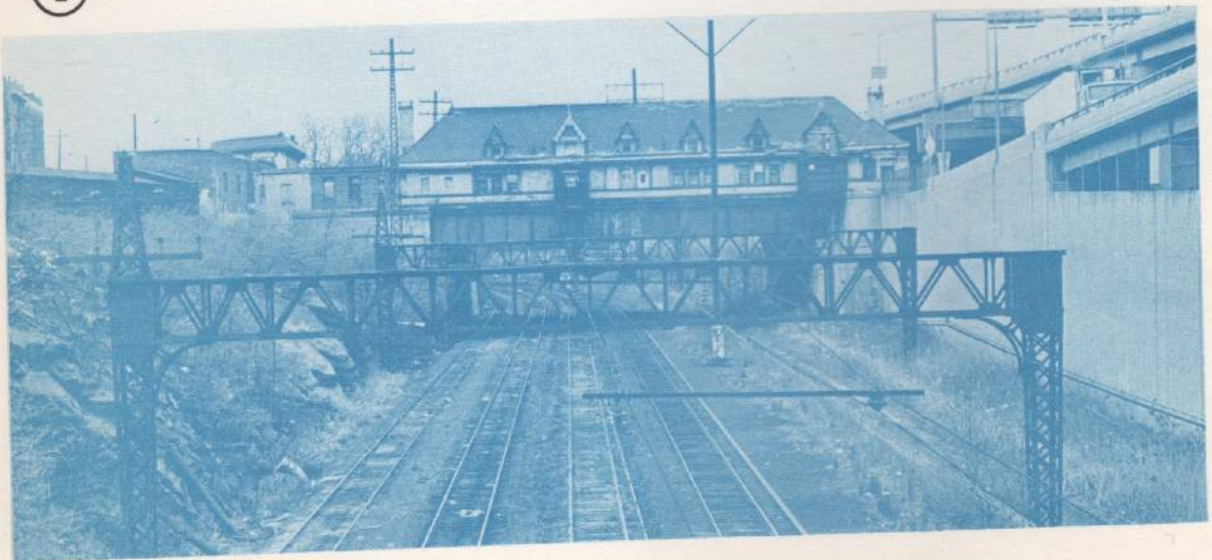
43



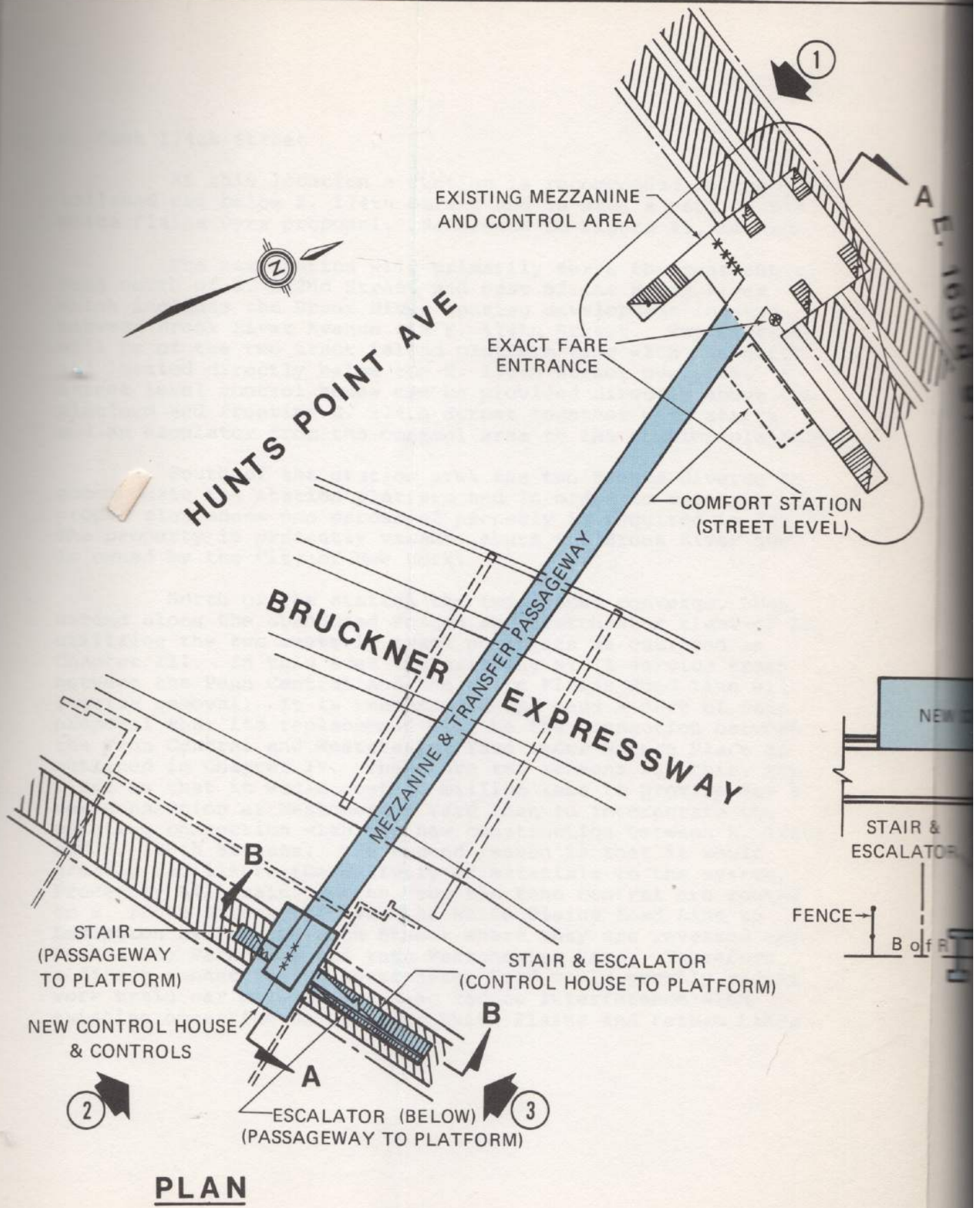
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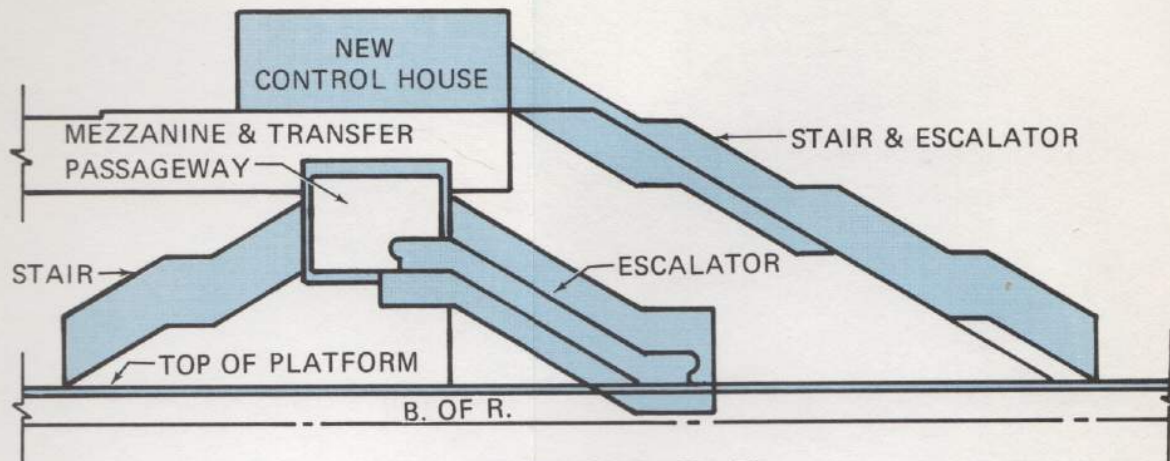


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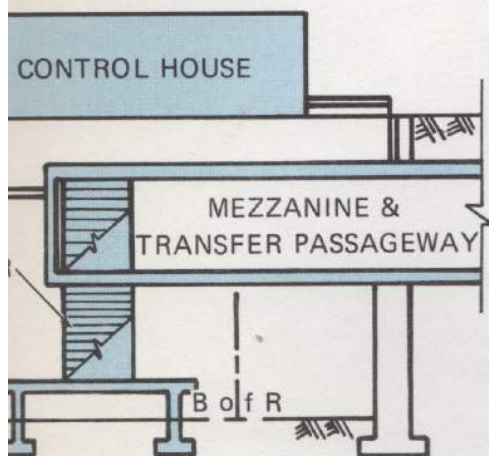
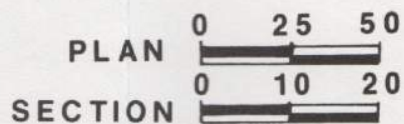


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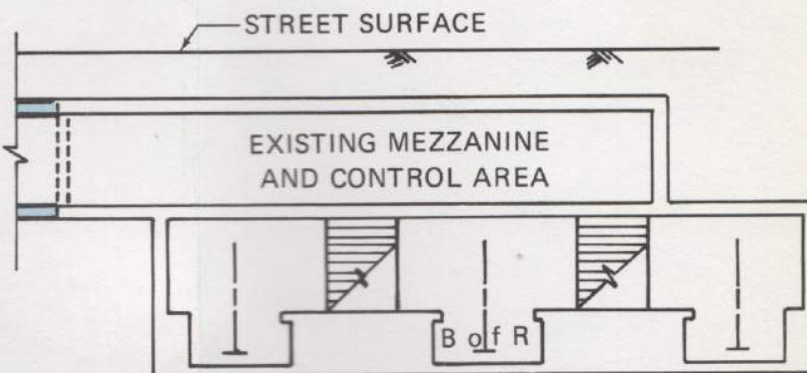


SECTION B-B



NEW STATION

SECTION A-A



EXISTING STATION

RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
HUNTS POINT AVE
STATION WHITE PLAINS
- DYRE PROPOSAL

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b. East 174th Street

At this location a station is recommended in the railroad cut below E. 174th Street and is made a part of the White Plains Dyre proposal. Reference to Figure 45, is made.

The new station will primarily serve the residential area north of E. 172nd Street and east of the Bronx River which includes the Bronx River housing development located between Bronx River Avenue and E. 174th Street. The station will be of the two track island platform type with the north end located directly below the E. 174th Street overpass. A street level control house can be provided directly above the platform and fronting E. 174th Street together with stairs and an escalator from the control area to the station platform.

South of the station area the two tracks diverge to accommodate the station platform and in order to maintain the proper clearances one parcel of property is required in fee. The property is presently vacant, abuts the Bronx River and is owned by the City of New York.

North of the station the two tracks converge, then extend along the abandoned Boston and Westchester right-of-way, utilizing the two westerly track positions as outlined in Chapter III. In this area the existing NYCTA service track between the Penn Central and the White Plains Road Line will require removal. It is recommended and made a part of this proposal that its replacement will be the connection between the Penn Central and Westchester Yard under Waters Place as outlined in Chapter IV. There are two reasons for this, the first is that it would cost \$2 million less to provide for a new connection at Westchester Yard than to incorporate the existing connection with the new construction between E. 174th and E. 180th Streets. The second reason is that it would greatly facilitate the delivery of materials to the system. Presently all trains coming from the Penn Central are routed to E. 180th Street then via the White Plains Road Line to Lexington Avenue and 86th Street where they are reversed onto Pelham Bay Park Line and into Westchester Yard. Therefore, a direct connection to Westchester Yard would greatly reduce work train car mileage and also reduce interference with existing operation on both the White Plains and Pelham Lines.

c. East 180th Street

At this location a new station is proposed for the Second Avenue Line with passenger transfer facilities to be provided with the existing White Plains Road Line station. Reference to Figure 46 is made. This is necessary to provide access to Seventh Avenue and Lexington Avenue Lines for passengers entering the system on the White Plains Road and Dyre Lines north of E. 180th Street and vice-a-versa. The existing operations on the White Plains Road Line will terminate at E. 180th Street and all operations on the Dyre and White Plains Road Lines north of E. 180th Street will be diverted to Second Avenue.

The new station will have a three track two island platform configuration, this is necessary to facilitate the meshing of the services from White Plains and Dyre Avenue. The middle track will operate southbound in the morning and northbound in the evening. Reference to Figure-47, is made. The station will be located in the area presently occupied by the abandoned Boston and Westchester Railroad station. The new platforms will each be 615 feet long replacing the existing platforms which are 480 feet long. The new platforms will be approximately 28 feet wide, about 8 feet wider than the existing. This can be accomplished since the new platforms can be widened toward the middle pocket to accommodate the one new track which replaces the two track middle pocket presently there. The wider platforms will allow for wide escalators and stairs to be provided from the new mezzanine level below. Access to the new station will be from both E. 180th Street and Morris Park Avenue. In addition the existing passageway between the new station and the E. 180th Street station of the White Plains Road Line will be refurbished and upgraded to provide the necessary passenger transfer facilities.

South of the station approximately 450 feet of the existing steel viaduct will require modification to accommodate the approach alignment. The center track can be connected to the two mainline tracks with number 10 turnouts and the mainline tracks can converge from 78 feet on center in the station area to 13 feet on center within the 450 foot reconstructed viaduct area.



WHITE PLAINS ROAD LINE

EXPRESSWAY

STREET

E. 174TH

SHERIDAN

EXPWY

PELHAM - DYRE PROPOSAL

WHITE PLAINS - DYRE
PROPOSAL

E. 174TH STREET

PROPOSED T.A. TRACKAGE ALONG
BOSTON AND WESTCHESTER R.O.W.

BRONX RIVER HOUSES

BRONX RIVER PARKWAY

PELHAM BAY PARK LINE

RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

EAST 174TH STREET
WHITE PLAINS DYRE
PROPOSAL

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BRONX PARK

BRONX RIVER

EXISTING E. 180TH STREET STATION

E. 180TH STREET SHOP

EXISTING
WHITE PLAINS ROAD LINE
STUB ENDED

RIVER

PARKWAY

WHITE PLAINS ROAD LINE

UNIONPORT SHOP

DYRE AVENUE LINE

E. 180TH STREET

BRONX

E. 180TH

RAPID TRANSIT EXTENSION TO NORTHEAST BRONX, N.Y. EAST 180TH STREET WHITE PLAINS DYRE PROPOSAL	TS C-230
	46



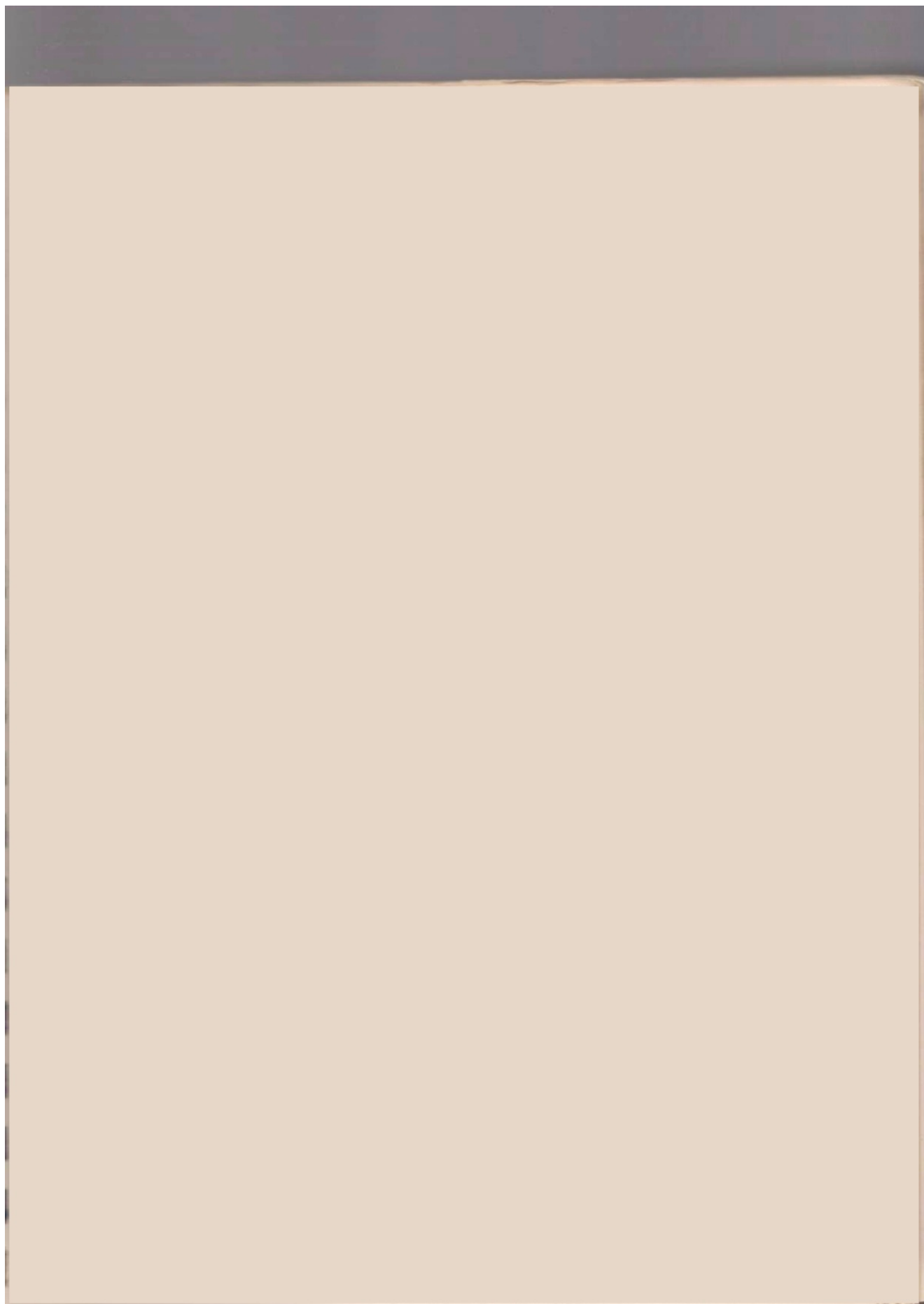
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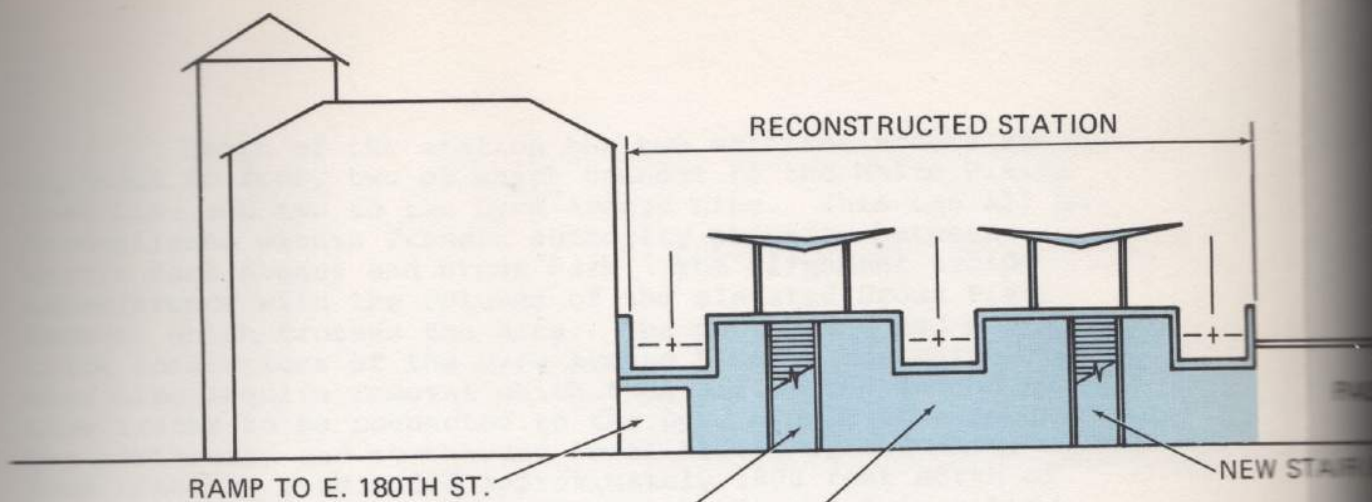


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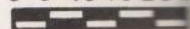
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SECTION A

0 5 10 15 20 25



RENOVATED MEZZANINE AND CONTROL AREA

A

RAMP TO E. 180TH ST.
(CLOSED)

3

E.

PARKING LOT

PASSAGEWAY

EXISTING

PLATFORM

NEW

PLATFORM

RAMP TO E. 180TH ST.

RENOVATED MEZZANINE
AND CONTROL AREA

180th ST

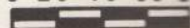
A

T.A.
SUB-STATION

MORRIS PARK AVE

PLAN

0 20 40 60 80



EXISTING I.R.T. STATION

PASSAGEWAY

IR & ESCALATOR

A A

STAIR

I.R.T. MEZZ

RAMP TO E. 180TH ST.
(CLOSED)

2

1

BRONX RIVER PARKWAY (ELEVATED)

RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
EAST 180TH STREET
STATION
WHITE PLAINS
DYRE PROPOSAL

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North of the station the two mainline tracks can be expanded to four, two of which connect to the White Plains Road Line and two to the Dyre Avenue Line. This can all be accomplished within Transit Authority property between Morris Park Avenue and Bronx Park. The alignment avoids interference with the columns of the elevated Bronx River Parkway which crosses the area. The southbound and northbound track connections of the Dyre Avenue Line to the White Plains Road Line require removal which then allows the Second Avenue Line tracks to be connected to the Dyre Avenue Line on grade. The northbound and southbound local tracks of the White Plains Road Line are stub ended approximately 1800 feet north of E. 180th Street, which then allows the Second Avenue Line southbound track to be carried over the White Plains Road express track and connect to the southbound White Plains Road local track south of the Birchall Avenue station. The Second Avenue Line northbound track has to be carried over the Dyre Avenue southbound track and then can be connected to the White Plains northbound track also south of the Birchall Avenue station.

The alignment thus developed eliminates grade crossings, all tracks are grade separated and the existing White Plains Road express track is maintained before and after the new construction. The new connections will allow for approximately 15 to 20 mile per hour operations, the two restrictions which primarily account for this, are the number 8 turnouts required north of the new E. 180th Street station and the 3.5% grades needed on certain tracks to make the required connections. This should not be a restriction on providing the 15 train peak hour service on both lines, the wide platforms and three train pockets at the new E. 180th Street station should reduce dwell time of trains sufficiently to more than compensate for the lower operating speed in the flexing area.

As stated in Chapter IV new additional IRT train storage can be provided between all the new trackage described, and all within the existing limits of Transit Authority property. In addition the existing Maintenance of Way Union-port steel shop facility will not be interfered with by the new construction.

d. Car Storage and Maintenance Facilities

The only suitable car storage and maintenance facilities for the White Plains-Dyre proposal are the 239th Street yard and the north end of the Dyre Avenue Line right-of-way. These facilities are outlined in Chapter IV.

the remaining alternates are all too distant from either the White Plains or Dyre Lines to be utilized in this proposal. Therefore, these two storage and maintenance schemes are included and made an intergral and necessary part of the White Plains-Dyre plan.

The resulting loss of 239th Street yard to the A Division will require additional facilities to be made available. This can be provided at E. 180th Street where as previously described new storage tracks which can accommodate 8 full length A Division trains can be constructed. Also the existing E. 180th Street inspection shop can be modified and upgraded to be used by the A Division to compensate for the loss of the shop at 239th Street. Therefore, these additional facilities are also included and made an integral and necessary part of the White Plains-Dyre plan.

The existing express track north and south of E. 180th Street on the White Plains Road Line can also be utilized by the A Division for storage. Since there will be no express service between 149th and 180th Streets the entire length of the express track can be used for layup of A Division trains. As previously described north of E. 180th Street the Second Avenue connection to the White Plains Road Line will be made without interference to the existing express track. Therefore, it can be proposed that between E. 180th Street and Gun Hill Road the express track can also be utilized for A Division storage. Between Gun Hill Road and E. 241st Street it is necessary for the track to be used by Second Avenue Line trains for layup and as a drill track for entrance and egress from 239th Street yard.

Pelham - Dyre Proposal

As previously described in the introduction this proposal consists of extending the Second Avenue Line along the Penn Central Railroad right-of-way to E. 174th Street then north along the abandoned Boston and Westchester railroad right-of-way to E. 180th Street where a connection is made to the Dyre Avenue Line. In addition, in the vicinity of Longwood Avenue two tracks diverge and extend in subway under Bruckner Boulevard to the vicinity of Aldous Street where a connection is made to the Pelham Bay Park Line local tracks.

The new construction required along the Penn Central, Boston and Westchester, Pelham and Dyre Avenue Lines to implement this proposal is as outlined in Chapter III. Special work is required at Hunts Point Avenue, E. 174th Street and E. 180th Street to integrate the new construction with the existing facilities. In addition new car storage and maintenance facilities are required to make the plan operational. These items will be outlined and described as follows.

a. Hunts Point Avenue

At this location, as the Second Avenue Line enters the study area, it is required that two tracks diverge and connect to the Pelham Bay Park Line. In addition a new station is required with transfer facilities to the existing express subway station of the Pelham Line. Reference to Figure-48, is made. This is necessary to provide access to Lexington Avenue for Pelham riders entering the line north of Hunts Point Avenue since under this proposal the present Pelham service will terminate at the existing Hunts Point Avenue station.

Basically two schemes were studied for providing the new station and making the connection to the Pelham Line. The first involves diverting two tracks in subway under Bruckner Boulevard, providing a new station in the vicinity of the existing Hunts Point Avenue station, then connecting to the Pelham Line in subway in the vicinity of Aldous Street. The second involves providing a new station in the railroad cut below Hunts Point Avenue, then north of the station diverting two tracks in aerial construction over and across the New Haven Railroad and the Bronx River, and connecting to the Pelham Line along Westchester Avenue south of the Elder Avenue station.

The aerial scheme after careful review cannot be recommended for the following reasons. In crossing over the Bronx River the new southbound track would have to be carried over the existing Pelham express track (this is necessary since under this proposal the track will be converted to a yard lead for the A Division from Hunts Point Avenue to Westchester Yard) and the resulting structure would be some 80 feet above the street surface requiring tower construction, new columns in the street bed of Westchester Avenue and air rights over existing private property. In addition the resulting vertical alignment would require grades in excess of 3% for long distances. Finally the resulting structure would be costly, environmentally unsuitable and unacceptable to the surrounding community.

The subway connecting scheme as indicated on Figure 48, and Figure 49, is recommended. The flexing required for this connection begins at Longwood Avenue by depressing the northbound Dyre track and passing the northbound Pelham connecting track under the southbound Dyre track. Number 10 turnouts are used allowing a 20 MPH operation. The two connecting tracks continue in subway under Bruckner Boulevard and extend into the station area between Barretto Street and Hunts Point Avenue. The new station is of the island platform configuration 615 feet long with entrances, controls and mezzanine located below Hunts Point Avenue and interconnected with the existing Hunts Point Avenue station control area. North of the station area the two tracks extend and connect to the Pelham Line local tracks in the vicinity of Aldous Street with the southbound track requiring to pass under the Pelham Line north of the station area at E. 163rd Street. Reference to Figure 50, is made. The subway work required in this area is typical NYCTA jack-arch construction. The only variation occurring under the Bruckner Expressway where approximately 10 columns would require underpinning to accommodate the new work.

b. East 174th Street

At this location the recommendation for the Pelham Dyre proposal is identical with the White Plains-Dyre proposal. A new station together with the removal of the Maintenance of Way service track and its replacement under Waters Place is required.



WESTCHESTER
AVENUE

LONGWOOD

EXISTING PELHAM BAY PARK LINE
BRUCKNER EXPWY

PROPOSED PELHAM BAY
PARK CONNECTION
PELHAM - DYRE PROPOSAL

EXISTING HUNTS POINT
AVENUE STATION

POINT

NEW HUNTS POINT
AVENUE STATION
& PASSAGEWAY

PROPOSED T.A. TRACKAGE
ALONG PENN CENTRAL R.O.W.

PORTAL

RIVER

BRONX

RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

HUNTS POINT AVENUE
PELHAM DYRE PROPOSAL

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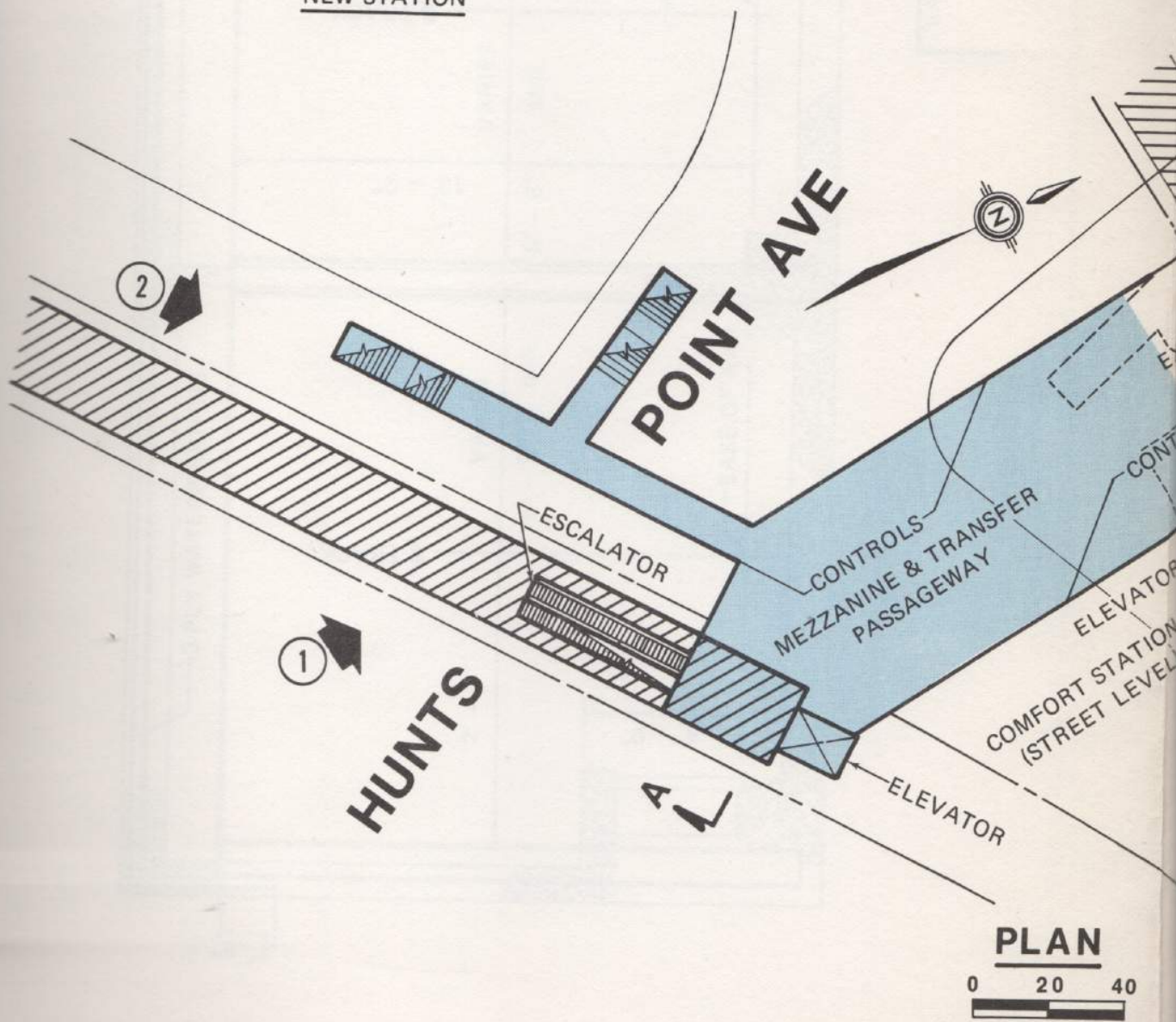
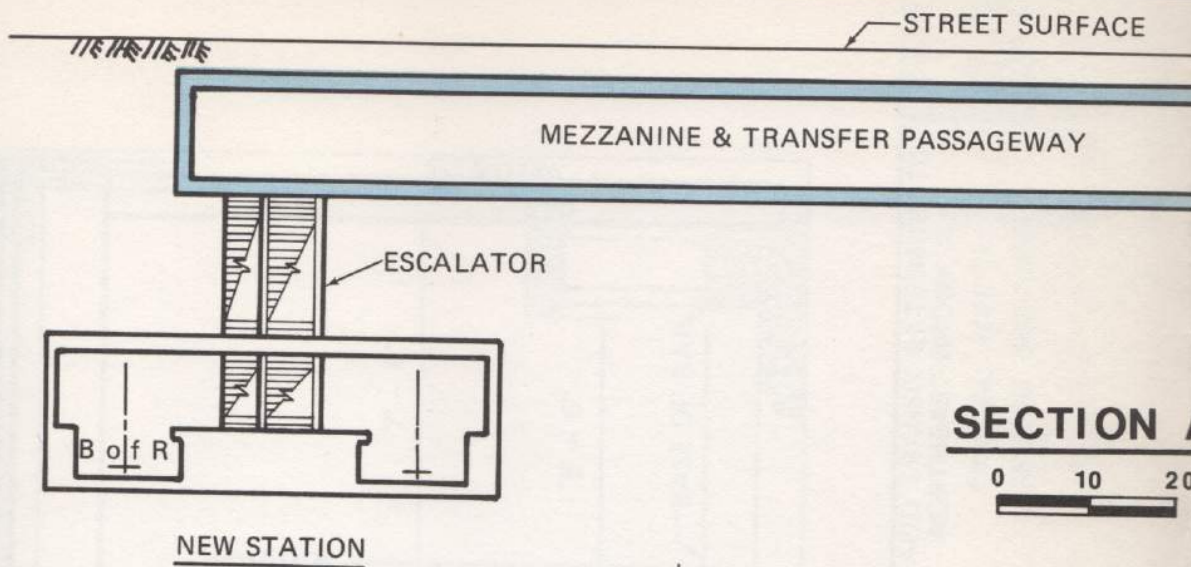
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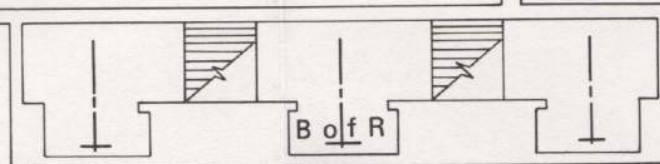
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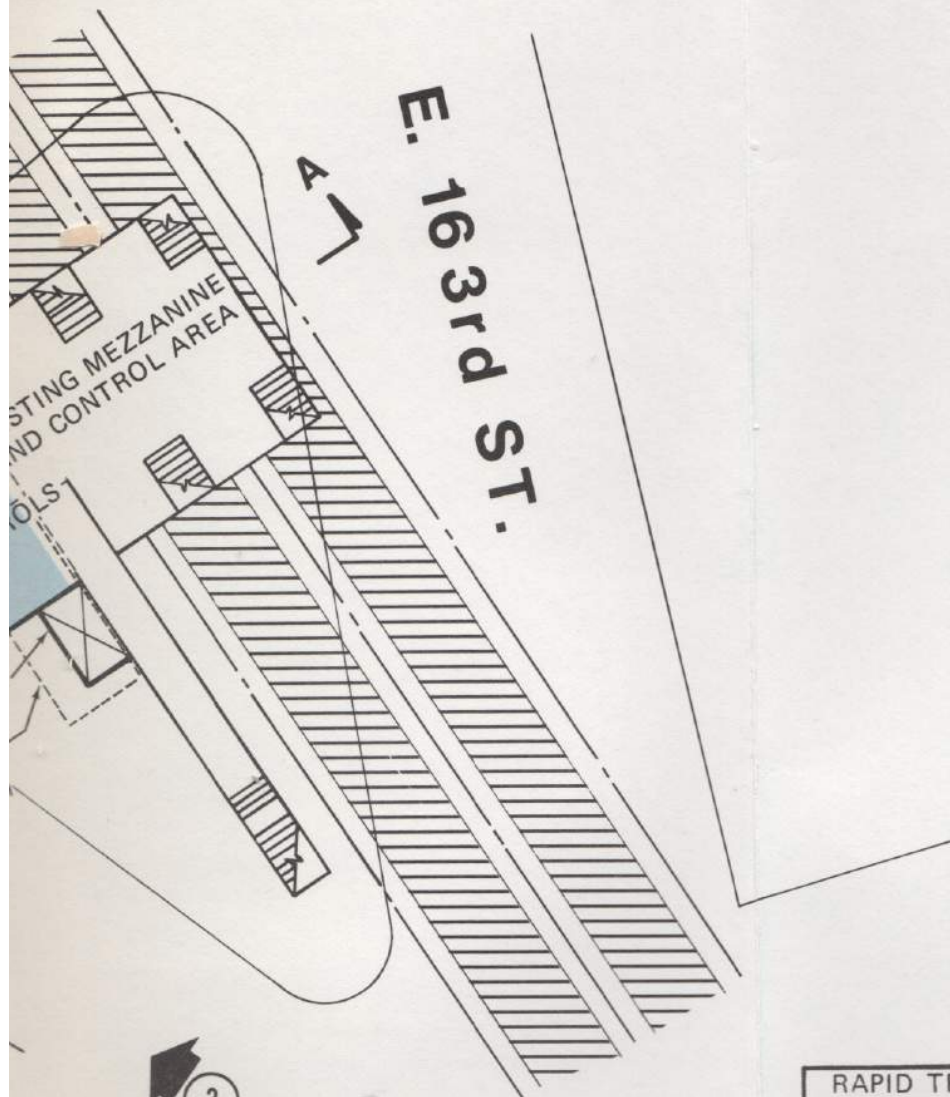


EXISTING MEZZANINE
AND CONTROL AREA



EXISTING STATION

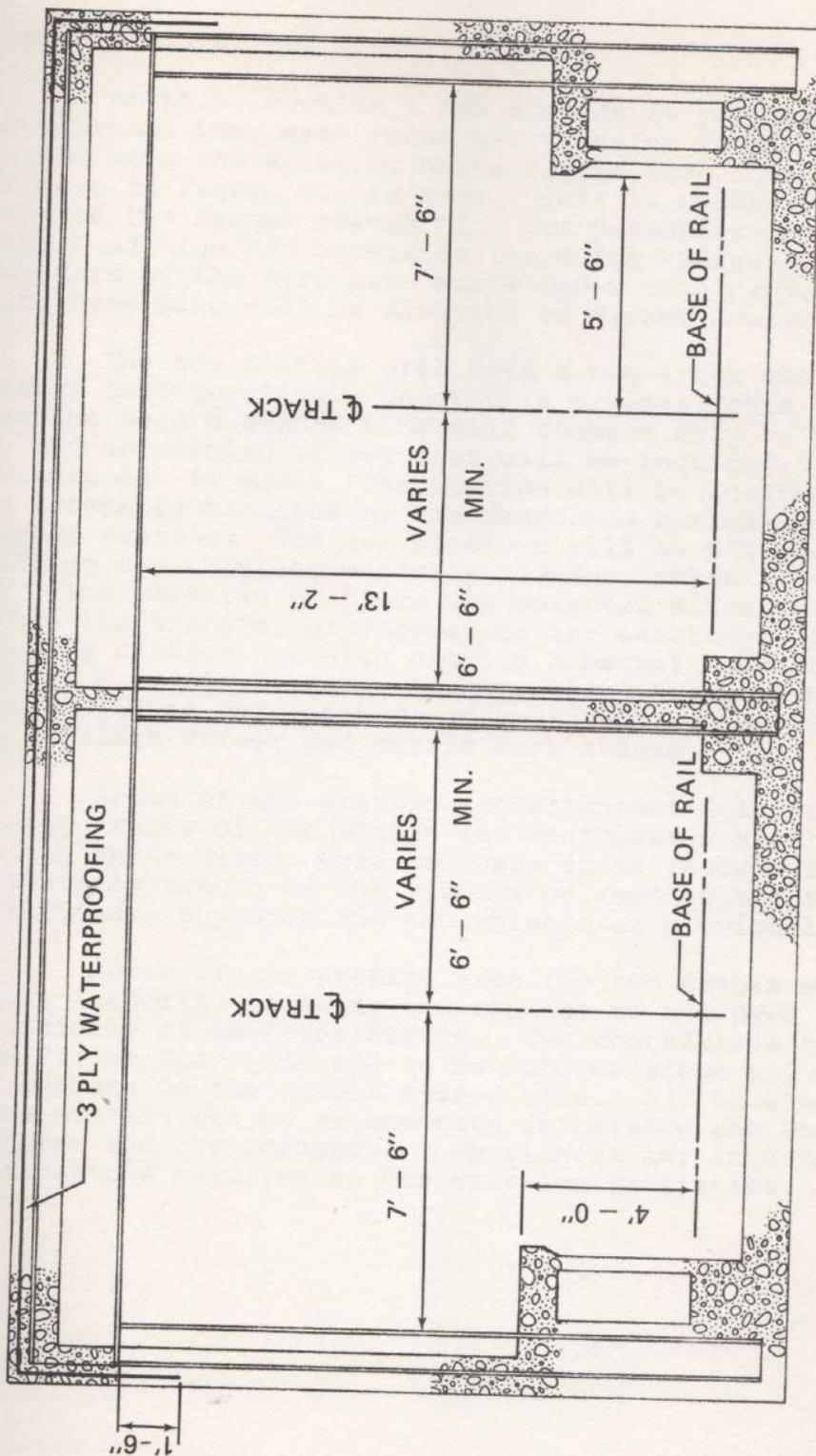
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RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
HUNTS POINT AVENUE
STATION
PELHAM DYRE PROPOSAL

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RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

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TYPICAL NYCTA
SUBWAY SECTION

c. East 180th Street

At this location a new station is proposed for the Second Avenue Line with passenger transfer facilities to be provided with the existing White Plains Road Line station. Reference to Figure 51, is made. This is necessary to provide access to the Second Avenue Line for passengers on the White Plains Road Line and access to the White Plains Road Line for passengers on the Dyre Line since under this proposal the entire Dyre Line will be diverted to Second Avenue.

The new station will have a two track one island platform configuration. Under this proposal this is sufficient since the Second Avenue Line will connect only to the Dyre Line and no meshing of services will be required. Reference to Figure 52, is made. The station will be located in the area presently occupied by the abandoned Boston and Westchester Railroad station. The new platform will be 615 feet long replacing the existing westerly platform which is 480 feet long. The westerly platform was selected since this would shorten the transfer passageway to the existing White Plains Road Line station and also provide a better approach alignment south of E. 180th Street. The existing mezzanine below the station will be refurbished and upgraded, access will be from both E. 180th Street and Morris Park Avenue.

South of the station the alignment follows the two westerly tracks of the Boston and Westchester Railroad. As with the White Plains Dyre proposal it is recommended that the two easterly tracks of the viaduct be removed and the remaining structure upgraded and refurbished as previously outlined.

North of the station area the two tracks extend along Transit Authority property and connect to the Dyre Line in the vicinity of Amethyst Street. The connections to the White Plains Road Line are to be removed since all Dyre trains will operate on the Second Avenue Line. All this work north of the station can be accommodate in between the White Plains Road Line and the Unionport Shop without any interference or modifications required to the existing facilities.

d. Car Storage and Maintenance Facilities

The only suitable car storage and maintenance facilities for the Pelham-Dyre proposal are Westchester Yard and the north end of the Dyre Avenue Line right-of-way. These facilities are outlined in Chapter IV, the remaining alternates are all too distant from either the Pelham or Dyre Lines to be utilized in this proposal. Therefore, these two storage and maintenance schemes are included and made an integral and necessary part of the Pelham Dyre plan.

The resulting loss of Westchester Yard to the Maintenance of Way Department will require the dispersal of the present track paneling facility to Jerome Avenue, 239th Street and E. 180th Street yards. Presently there is no one suitable area in the northeast Bronx where this facility can be relocated in its entirety.

The existing express track south of Hunts Point Avenue can be utilized by the A Division for storage. This is made possible by the fact that there will be no express service on the Pelham Line between Hunts Point Avenue and E. 138th Street under this proposal. The express track north of Hunts Point Avenue up to Westchester Yard will be utilized by the A Division for access to Westchester Yard. Its present wayside signal system in two directions will be maintained, in addition cab signaling will be installed in two directions making the track usable by Second Avenue Line trains during emergencies. Between Westchester Yard and Pelham Bay Park the express track will be used for layup of Second Avenue Line trains, this will facilitate terminal operations and access to Westchester Yard.



BRONX PARK

BRONX RIVER

PARKWAY

WHITE PLAINS ROAD LINE

EXISTING E. 180TH STREET STATION

E. 180TH STREET SHOP

RIVER

DYRE AVENUE LINE

UNIONPORT SHOP

E. 180TH STREET

BRONX

PENN CENTRAL R.O.W.

RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

EAST 180TH STREET
PELHAM DYRE PROPOSAL

TS C-230

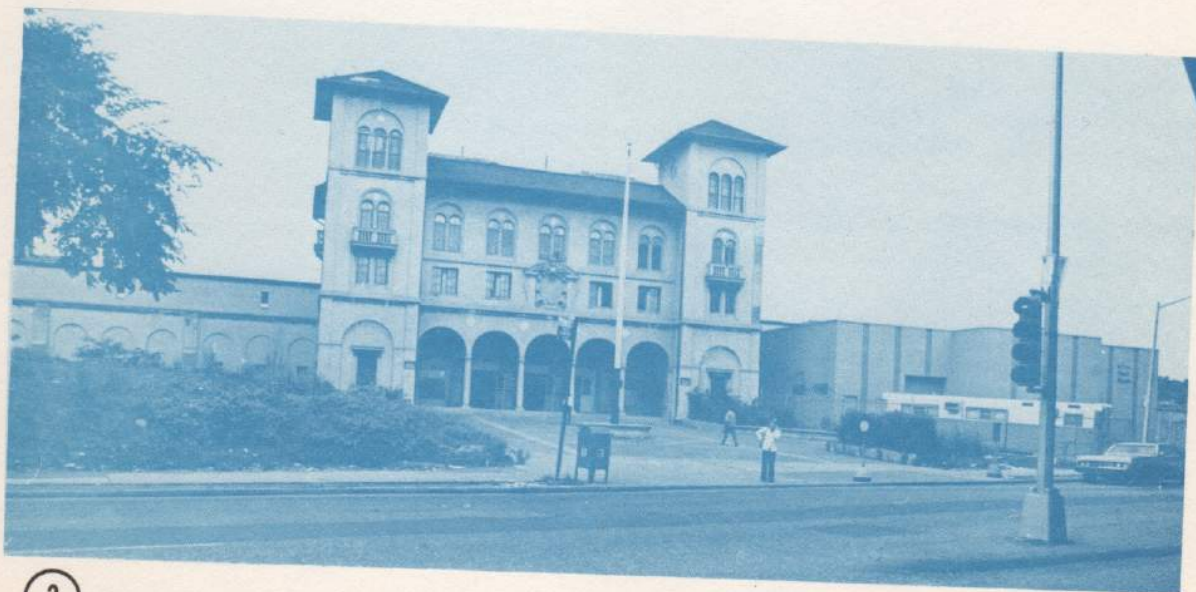
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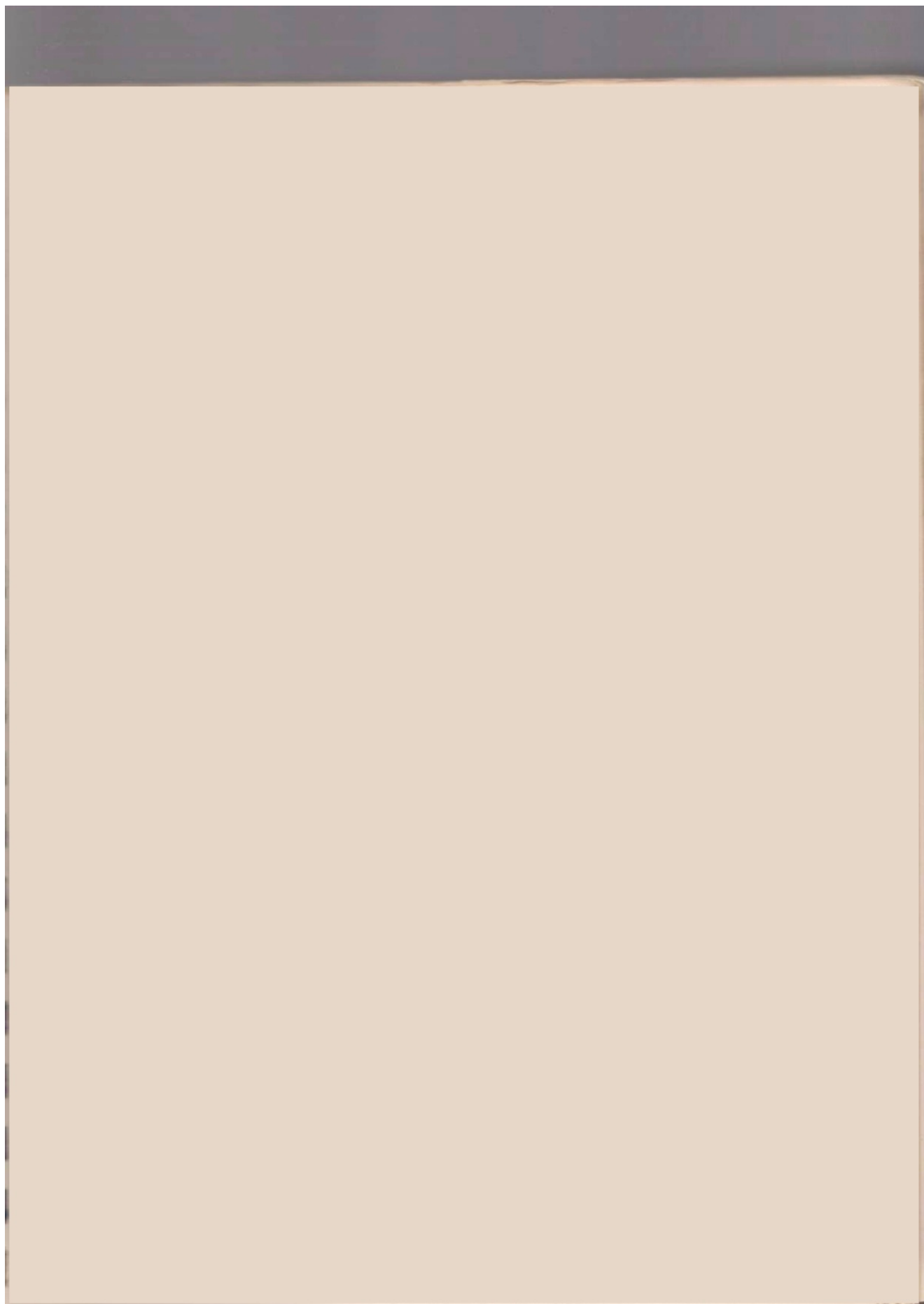
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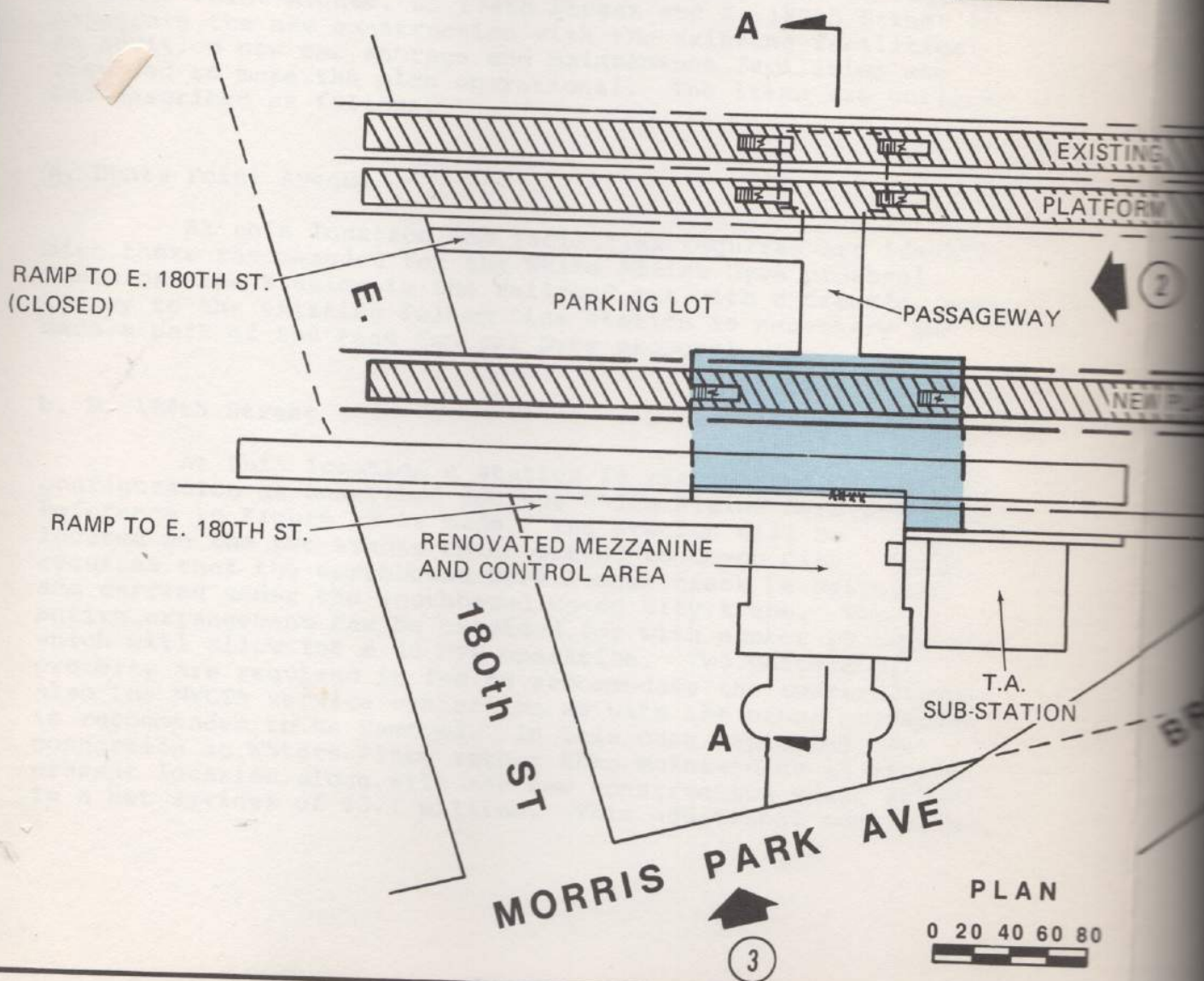
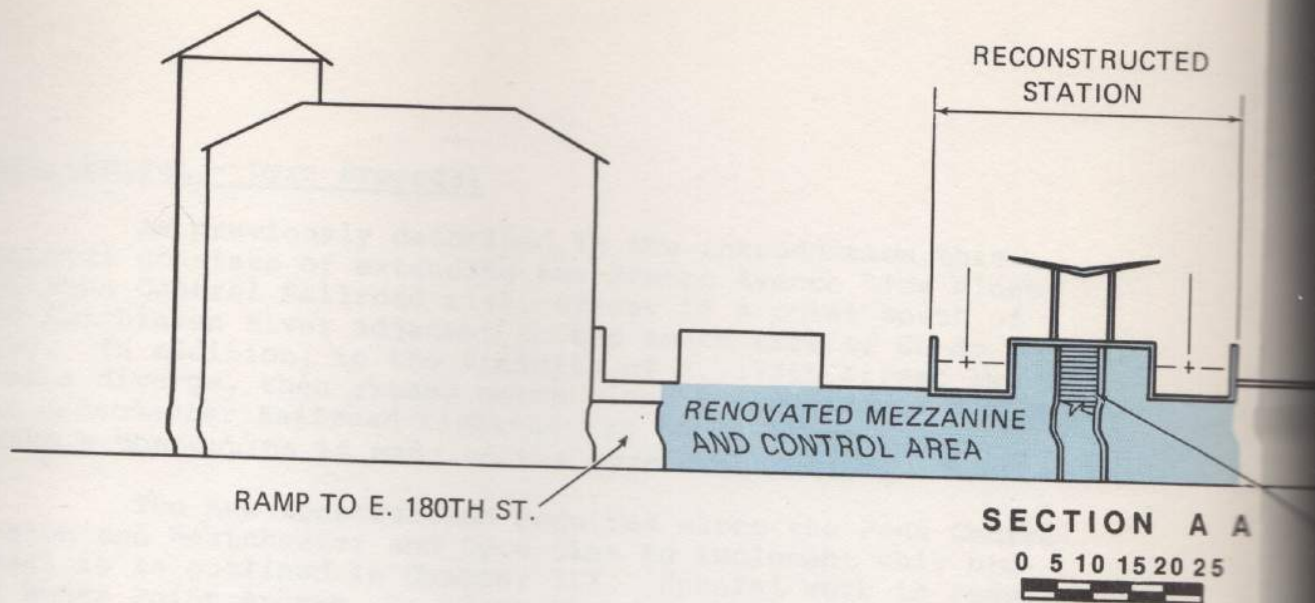


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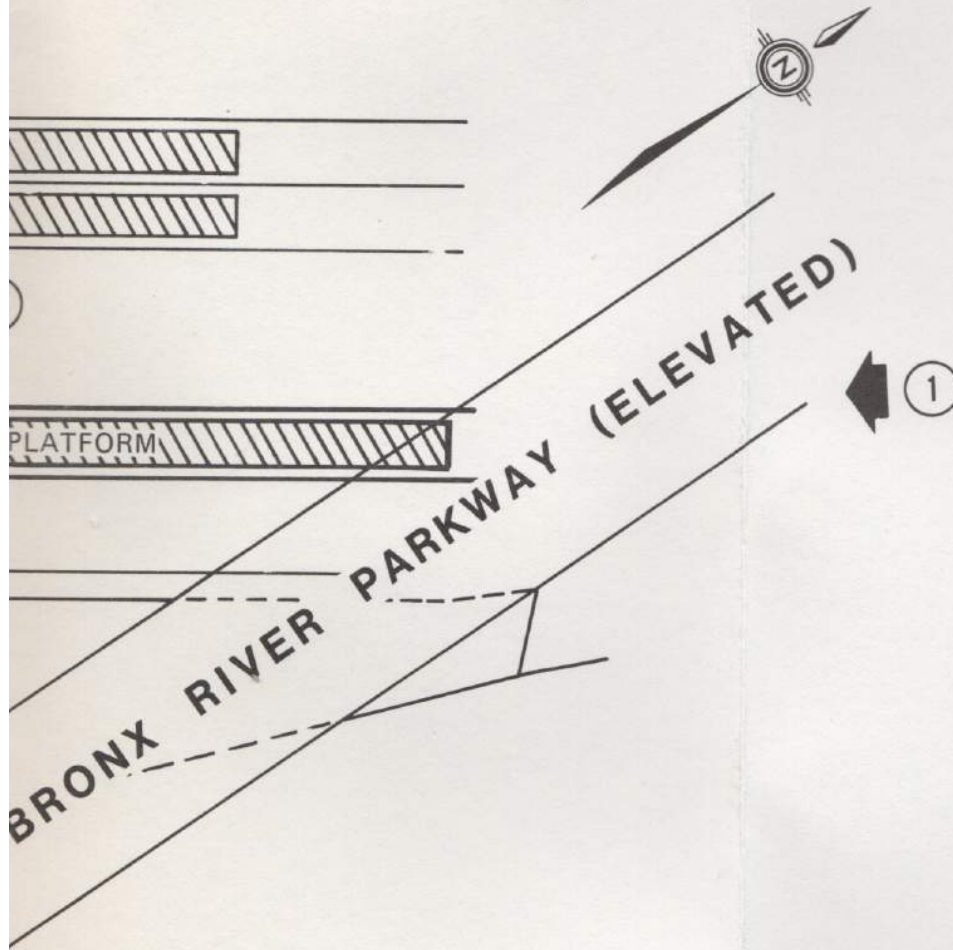
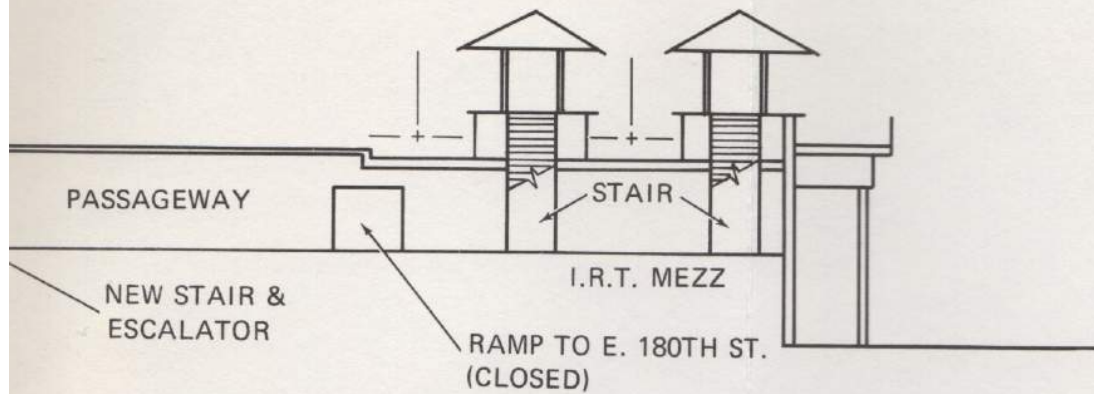


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EXISTING I.R.T. STATION



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.
EAST 180TH STREET
STATION
PELHAM DYRE PROPOSAL

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Penn Central - Dyre Proposal

As previously described in the introduction this proposal consists of extending the Second Avenue Line along the Penn Central Railroad right-of-way to a point south of the Hutchinson River adjacent to the south site of Co-op City. In addition, in the vicinity of E. 174th Street two tracks diverge, then extend north along the abandoned Boston and Westchester Railroad right-of-way to E. 180th Street where a connection is made to the Dyre Avenue Line.

The new construction required along the Penn Central, Boston and Westchester and Dyre Line to implement this proposal is as outlined in Chapter III. Special work is required at Hunts Point Avenue, E. 174th Street and E. 180th Street to integrate the new construction with the existing facilities. In addition new car storage and maintenance facilities are required to make the plan operational. The items are outlined and described as follows.

a. Hunts Point Avenue

At this location the facilities required are identical with those recommended for the White Plains Dyre proposal. Therefore the station in the railroad cut with a transfer passageway to the existing Pelham Line station is necessary and made a part of the Penn Central Dyre proposal.

b. E. 174th Street

At this location a station is recommended of similar configuration as described for the White Plains Dyre proposal. Reference to Figure 53 is made. The station will be located on the two tracks which extend to Co-op City. This requires that the northbound Dyre Avenue track be depressed and carried under the southbound Co-op City track. The entire arrangement can be provided for with number 20 turnouts which will allow for a 40 MPH operation. Two parcels of property are required in fee to accommodate the construction. Also the NYCTA service connection as with the other proposals is recommended to be removed. In this case replacing the connection at Waters Place rather than maintaining it at its present location along with the new construction would result in a net savings of \$3.7 million. This additional cost occurs

in this proposal because it is necessary to carry the service track over the two new Co-op tracks to extend it from the Penn Central right-of-way to the Boston and Westchester right-of-way.

c. E. 180th Street

At this location the facilities required are identical with those recommended for the Pelham-Dyre proposal. Therefore the two track one island platform station with a transfer passageway to the White Plains Road Line is necessary and made a part of the Penn Central Dyre proposal.

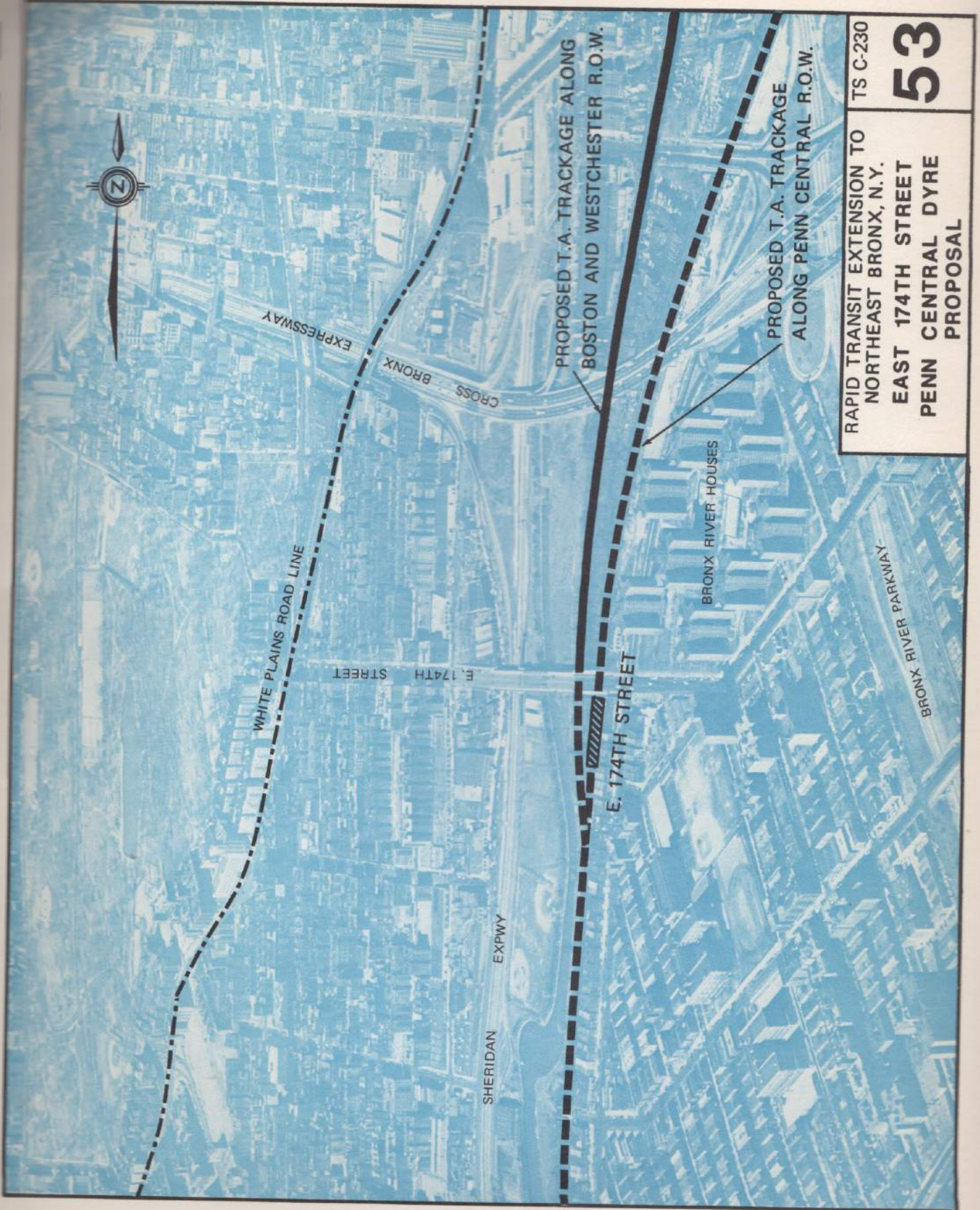
d. Car Storage and Maintenance Facilities

The two car storage and maintenance facilities recommended for the Penn Central Dyre proposal are the north end of the Dyre Avenue Line right-of-way and Westchester Yard. These facilities are outlined in Chapter IV.

For the Dyre Avenue Line there is no other suitable alternative to utilizing the vacant area between the operating tracks for car storage and maintenance facilities. For the Penn Central leg of this proposal three alternate sites exist other than Westchester Yard, they are the American Cystoscope property, Pelham Bay Park and the vacant area between the north and south sites of Co-op City.

The American Cystoscope property cannot be used because the Board of Estimate of the City of New York purchased the site and leased it to the Farberware Company, a manufacturer of kitchen utensils, for a period of 20 years and by a letter dated March 22, 1974 officially advised the Authority of this fact.

The use of Pelham Bay Park could not be recommended as long as other alternates, even though not as suitable, are available. The great environmental concern expressed by the public in recent years weighs very heavily against selecting this site for car storage and maintenance use. The vacant area within Co-op City also could not be recommended for the following reasons. Its location is some 3,000 feet west of the Penn Central right-of-way and an additional \$53 million in construction costs would be required to carry the necessary trackage below the New England Thruway, Hutchinson River Parkway and into the required area.



RAPID TRANSIT EXTENSION TO
NORTHEAST BRONX, N.Y.

EAST 174TH STREET
PENN CENTRAL DYRE
PROPOSAL

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Also the property would have to be condemned and its present owners compensated and this would add substantially to the above figure.

Westchester Yard together with lead tracks under Waters Place and private property to the Penn Central right-of-way in the vicinity of Eastchester Road is the recommended storage site for the Penn Central leg of this proposal. As with the Pelham Dyre proposal the present Maintenance of Way track paneling facility would have to be dispersed to Jerome Avenue, E. 239th Street and E. 180th Street yards.

Summary and Conclusion

The three proposals outlined in this Chapter are all feasible. Table 27 summarizes the detailed work at the key interconnecting areas. The capital and operating costs together with a summary of private property requirements will be outlined in Chapter VI. An evaluation and analysis from both a transportation and an engineering aspect will be presented in Chapter VII.

TABLE 27

SUMMARY OF SPECIFIC WORK REQUIRED FOR EACH PROPOSAL

Proposal	Reference Area			
	Hunts Point Avenue	E. 174th Street *	E. 180th Street	Recommended Storage
White Plains Dyre	New Station in Railroad Cut Passageway to existing Hunts Point Station	New Station in Railroad Cut	New 3 Track 2 Island Station Passageway to existing E. 180th Street Station	239th Street Yard North End Dyre ROW
Pelham Dyre	New Station in subway under Bruckner Blvd. Direct connection with existing mezzanine of Hunts Point Station	New Station in Railroad Cut	New 2 Track 1 Island Station Passageway to existing E. 180th Street Station	Westchester Yard North End Dyre ROW
Penn Central Dyre	New Station in Railroad Cut Passageway to existing Hunts Point Station	New Station in Railroad Cut on Penn Central leg trackage	New 2 Track 1 Island Station Passageway to existing E. 180th Street Station	Westchester Yard North End Dyre ROW

* For all proposals existing NYCTA service track to be relocated in Westchester Yard

CHAPTER VI

CAPITAL AND OPERATING COSTS

Introduction

The purpose of this chapter is to present a summary of the data and methods used in the study of capital and operating costs. The data were obtained from a survey of 100 manufacturing plants in the United States.

The survey was conducted by the Bureau of Economic Warfare, U. S. Department of War, during the years 1941-1942. The data were obtained from a questionnaire sent to 100 manufacturing plants in the United States. The questionnaire was designed to obtain information on the following items: (1) Name of plant, (2) Location, (3) Type of plant, (4) Year of construction, (5) Total capacity, (6) Total production, (7) Total cost of production, (8) Total operating cost, (9) Total capital cost, (10) Total depreciation cost, (11) Total maintenance cost, (12) Total repair cost, (13) Total fuel cost, (14) Total power cost, (15) Total labor cost, (16) Total material cost, (17) Total overhead cost, (18) Total profit, (19) Total loss, (20) Total net income.

The capital cost of a plant is the cost of the fixed assets of the plant, including land, buildings, machinery, and equipment. The operating cost of a plant is the cost of the variable inputs of the plant, including labor, materials, and overhead. The total cost of production is the sum of the capital cost and the operating cost. The total operating cost is the sum of the labor, materials, and overhead costs. The total capital cost is the sum of the land, buildings, machinery, and equipment costs. The total depreciation cost is the cost of the depreciation of the fixed assets of the plant. The total maintenance cost is the cost of the maintenance of the fixed assets of the plant. The total repair cost is the cost of the repair of the fixed assets of the plant. The total fuel cost is the cost of the fuel used in the plant. The total power cost is the cost of the power used in the plant. The total labor cost is the cost of the labor used in the plant. The total material cost is the cost of the materials used in the plant. The total overhead cost is the cost of the overhead of the plant. The total profit is the profit of the plant. The total loss is the loss of the plant. The total net income is the net income of the plant.

The capital cost of a plant is the cost of the fixed assets of the plant, including land, buildings, machinery, and equipment. The operating cost of a plant is the cost of the variable inputs of the plant, including labor, materials, and overhead. The total cost of production is the sum of the capital cost and the operating cost. The total operating cost is the sum of the labor, materials, and overhead costs. The total capital cost is the sum of the land, buildings, machinery, and equipment costs. The total depreciation cost is the cost of the depreciation of the fixed assets of the plant. The total maintenance cost is the cost of the maintenance of the fixed assets of the plant. The total repair cost is the cost of the repair of the fixed assets of the plant. The total fuel cost is the cost of the fuel used in the plant. The total power cost is the cost of the power used in the plant. The total labor cost is the cost of the labor used in the plant. The total material cost is the cost of the materials used in the plant. The total overhead cost is the cost of the overhead of the plant. The total profit is the profit of the plant. The total loss is the loss of the plant. The total net income is the net income of the plant.

The capital cost of a plant is the cost of the fixed assets of the plant, including land, buildings, machinery, and equipment. The operating cost of a plant is the cost of the variable inputs of the plant, including labor, materials, and overhead. The total cost of production is the sum of the capital cost and the operating cost. The total operating cost is the sum of the labor, materials, and overhead costs. The total capital cost is the sum of the land, buildings, machinery, and equipment costs. The total depreciation cost is the cost of the depreciation of the fixed assets of the plant. The total maintenance cost is the cost of the maintenance of the fixed assets of the plant. The total repair cost is the cost of the repair of the fixed assets of the plant. The total fuel cost is the cost of the fuel used in the plant. The total power cost is the cost of the power used in the plant. The total labor cost is the cost of the labor used in the plant. The total material cost is the cost of the materials used in the plant. The total overhead cost is the cost of the overhead of the plant. The total profit is the profit of the plant. The total loss is the loss of the plant. The total net income is the net income of the plant.

Summary of Results

The data obtained from the survey of 100 manufacturing plants in the United States are summarized in the following tables. The first table shows the total capital cost, total operating cost, total cost of production, total depreciation cost, total maintenance cost, total repair cost, total fuel cost, total power cost, total labor cost, total material cost, total overhead cost, total profit, total loss, and total net income for each plant. The second table shows the average values for each of these items.

CAPITAL AND OPERATING COSTS

TABLE 29
ESTIMATED ANNUAL OPERATING COSTS
OF ALTERNATE RAPID TRANSIT PROPOSALS
IN THE NORTHEAST BRONX

PROPOSALS	ANNUAL REVENUE CAR MILES (MILLIONS)	ANNUAL OPERATING COSTS (MILLIONS)							TOTAL ANNUAL OPERATING EXPENSES
		MAINT. OF WAY & STRUCT.	MAINT. OF EQUIPT.	POWER	OPER. OF CARS	OPER. OF STATIONS	INJURIES & ACCIDENTS	GENERAL & MISC.	
WHITE PLAINS DYRE	10.77	4.36	4.48	2.92	10.90	2.43	.36	4.58	30.02
PENN CENTRAL DYRE	9.42	3.82	3.92	2.54	9.53	1.75	.33	4.39	26.28
PELHAM DYRE	9.13	3.70	3.79	2.48	9.23	2.57	.32	3.39	25.48

TABLE 30

PRINCIPLE UNIT COSTSCAPITAL

<u>Description</u>	<u>Unit</u> *	<u>Unit Price</u>
Earth Excavation	CY	\$120
Decking	SY	\$160
Concrete Masonary	CY	\$235
Structural Steel	TON	\$2350
Reinforcement Bars	TON	\$1900
Waterproofing	SY	\$13
Track-Subway	TM	\$2.8 M
Track-Elevated, Open Cut Embankment	TM	\$1.6 M
Signals	TM	\$1.4 M
Power	TM	\$1.8 M
Line Equipment-Subway	TM	\$2.4 M
Line Equipment-Elevated, Open Cut, Embankment	TM	\$0.45 M

OPERATING

<u>Description</u>	<u>Unit</u> *	<u>Unit Price</u>
Maintenance of Equipment	RCM	\$0.41
Power	RCM	\$0.28
Operations of Cars	RCM	\$1.02
Injuries and Damages	RCM	\$0.03
General and Miscellaneous	RCM	\$0.66

- * CY - Cubic Yard
 SY - Square Yard
 TM - Track Mile
 RCM - Revenue Car Mile

The prices used are from the latest Transit Authority bids on similar work updated to January 1976. The general construction estimates are basically compiled around the six key items indicated together with a fixed percentage added for additional smaller items and contingencies. The track, signals, power and line equipment were estimated on a track mile basis from figures developed by the Authority based on similar work performed over the entire system on numerous capital projects completed in recent years.

The cost of transit cars is based on a price of \$337,000 each. This is developed from recent Authority experience in the purchase of the new R-44 and R-46 series cars. As previously outlined the new cars to be used in the northeast Bronx will be 75 feet long and furnished with air conditioning equipment.

Referring to Table 28, it can be seen that the three alternates are very nearly equal in length, however, the variation in their total cost is as high as 17%. There are several factors for this and they are enumerated as follows.

The Pelham Dyre proposal is the most expensive, primarily for the following two reasons. First the subway connection required at Hunts Point Avenue for this plan is approximately \$53 million more than the facilities required for either of the other plans. Second the dual signaling requirement for the express track of the Pelham Line between Westchester Yard and Whitlock Avenue which is a unique and singular requirement for this proposal adds approximately \$13 million more to this plan than either of the other two.

The next most expensive plan, actually only 6% less than the Pelham-Dyre proposal is the Penn-Central Dyre proposal. Again there are two reasons for this occurring. The first is that of three proposals this is the only plan where one of the branches is a completely new facility requiring new stations, track, power and line equipment facilities (the cost of signals is not considered, since under all proposals all lines will require new cab signaling and therefore this requirement is common to all plans). Second this proposal requires the construction of approximately a one-half mile long yard lead track in subway from Eastchester Road to Westchester Yard. This item alone adds some \$32 million more to this plan than either of the other two.

The results of all this make the White Plains-Dyre proposal the least expensive of the three plans. The following factors further highlight this fact. At Hunts Point Avenue the new station in the railroad cut with the transfer passageway to the existing Hunts Point Station is relatively easy and inexpensive to provide. At E. 180th Street the new station and required connections to the White Plains and Dyre Lines are either on grade or aerial construction, all within relatively ample property under the jurisdiction of the Transit Authority. Finally both branches of the proposals utilize existing transit structures with car storage and maintenance facilities (239th Street Yard and the north end of the Dyre right-of-way) together with lead tracks adjacent to or on the line.

Analysis of Annual Operating Costs

The annual operating costs for each proposal are indicated on Table 29. The revenue car mileage for each proposal was computed from typical daily schedules of operations intended for the Second Avenue Line in the northeast Bronx. Table 31 and Table 32 indicate the number of trains per hours that would operate on a line over a 24 hour period for weekdays, Saturdays, Sundays and holidays for a 30 TPH peak hour service and for a 15 TPH peak hour service. This data together with the length of each line allows the revenue car mile computation to be made easily and rapidly for each of the proposals in the northeast Bronx.

All the operating expenses exclusive of maintenance of way and operation of stations are computed from the estimated revenue car mileage figures and the latest costs for each item updated to January 1976, as tabulated in the Authority's Transit Record. Maintenance of Way costs are based on the length and type of new lines, while station operation costs are determined by the number and type of stations along the lines, again from tabulated and updated costs in the Authority's Transit Record.

The total gross annual operating expenses for the three proposals are all approximately the same with the White Plains Dyre plan being somewhat costlier than either the Penn Central Dyre or Pelham Dyre plans.

TABLE 31

TYPICAL NYCTA SCHEDULE
30 TPH PEAK HOUR SERVICE

<u>Time Period</u>	<u>Weekday</u>	<u>Saturday</u>	<u>Sunday Holiday</u>
12:00 - 1:00 A.M.	5		
1:00 - 2:00 A.M.	4	5	5
2:00 - 3:00 A.M.	3	4	4
3:00 - 4:00 A.M.	3	3	3
4:00 - 5:00 A.M.	3	3	3
5:00 - 6:00 A.M.	4	3	3
6:00 - 7:00 A.M.	7	3	3
7:00 - 8:00 A.M.	18	5	4
8:00 - 9:00 A.M.	30	10	5
9:00 - 10:00 A.M.	19	10	5
10:00 - 11:00 A.M.	15	10	5
11:00 - 12:00 A.M.	15	10	5
			6
12:00 - 1:00 P.M.	15		
1:00 - 2:00 P.M.	16	10	8
2:00 - 3:00 P.M.	15	10	7
3:00 - 4:00 P.M.	15	10	8
4:00 - 5:00 P.M.	21	10	7
5:00 - 6:00 P.M.	28	10	8
6:00 - 7:00 P.M.	18	10	7
7:00 - 8:00 P.M.	12	10	8
8:00 - 9:00 P.M.	8	9	6
9:00 - 10:00 P.M.	7	7	6
10:00 - 11:00 P.M.	5	8	6
11:00 - 12:00 P.M.	5	7	6
		6	6

Total Number
of Trains

291

183

134

TABLE 32

TYPICAL NYCTA SCHEDULE
15 TPH PEAK HOUR SERVICE

<u>Time Period</u>	<u>Weekday</u>	<u>Saturday</u>	<u>Sunday Holiday</u>
12:00 - 1:00 A.M.	5	5	5
1:00 - 2:00 A.M.	3	3	3
2:00 - 3:00 A.M.	4	4	4
3:00 - 4:00 A.M.	3	3	3
4:00 - 5:00 A.M.	3	3	3
5:00 - 6:00 A.M.	6	3	3
6:00 - 7:00 A.M.	7	5	4
7:00 - 8:00 A.M.	15	6	3
8:00 - 9:00 A.M.	9	6	4
9:00 - 10:00 A.M.	8	6	4
10:00 - 11:00 A.M.	5	6	5
11:00 - 12:00 A.M.	6	6	5
12:00 - 1:00 P.M.	6	6	5
1:00 - 2:00 P.M.	6	6	5
2:00 - 3:00 P.M.	8	6	5
3:00 - 4:00 P.M.	10	8	5
4:00 - 5:00 P.M.	13	7	5
5:00 - 6:00 P.M.	8	7	5
6:00 - 7:00 P.M.	6	6	5
7:00 - 8:00 P.M.	5	5	5
8:00 - 9:00 P.M.	5	4	5
9:00 - 10:00 P.M.	5	5	5
10:00 - 11:00 P.M.	5	5	6
11:00 - 12:00 P.M.	4	4	2
Total Number of Trains	155	125	104

If to these costs the net savings that would result from eliminating existing services on the White Plains, Dyre or Pelham Lines are applied, the following would be the results. All costs indicated are in millions of dollars.

Proposal	Gross Annual Operating Cost	Annual Savings From Eliminating Present Services	Net Annual Operating Cost
White Plains Dyre	30.02	20.73	9.29
Penn Central Dyre	26.28	8.86	17.91
Pelham Dyre	25.48	24.30	1.18

The resulting net annual operating costs clearly indicate that the Penn Central-Dyre proposal would be the most expensive. This occurs since with this plan one of the branches is a totally new line, thus it does not eliminate any existing service while the other branch eliminates the existing Dyre service which is only 7-8 TPH during the peak periods.

The Pelham Dyre proposal is the least expensive on a net basis since on the Pelham Line north of Hunts Point Avenue the present service consists of 28 TPH during the peak periods. Also the White Plains Dyre plan is intermediate on a net cost basis since on the White Plains Road Line north of E. 180th Street the present service consists of 17 TPH during the peak periods.

Analysis of Real Estate Costs

Table 33, summarizes the required properties for all the proposals. As noted all properties listed are required for the Penn-Central Dyre plan and for either the Pelham Dyre or White Plains Dyre plans two properties are required block 3861 lot 14 and block 4971 lot 50.

In considering the Pelham Dyre and White Plains Dyre proposals first the required properties to implement their construction are two vacant lots in the northeast Bronx. Based on present (1975-76) assessed valuation their market value should be less than \$100,000. Therefore, both in terms of cost relative to the total costs of the proposals or

TABLE 33

REQUIRED PROPERTIES

<u>Block</u>	<u>Lot</u>	<u>Description</u>	<u>1975-76 Valuation</u>		<u>Remarks</u>
			<u>Unimproved</u>	<u>Improved</u>	
3769	1	Vacant	35,000	35,000	Fee Title
3861	14	Vacant	25,000	25,000	Fee Title
4041	1	Service Station	35,000	55,000	Fee Title
4042	201	3 Story Building	16,000	24,000	Partial Fee
4062	36	1 Story Building	8,500	20,000	Fee Title
	38	1 Story Building	13,000	31,000	Fee Title
	40	Vacant	1,700	1,700	Fee Title
	42	2 Story Building	3,500	7,800	Fee Title
	49	1 Story Building	10,000	14,500	Fee Title
	51	2 Story Building	900	6,900	Fee Title
	52	2 Story Building	900	6,900	Fee Title
	53	1 Story Building	800	900	Fee Title
	54	3 Story Building	4,000	52,000	Fee Title
4411	300	3 Story Building	1,000,000	1,750,000	Partial Fee
4226	5	2 Story Building	1,550,000	3,130,000	Partial Fee
	6	1 Story Building	329,000	330,000	Partial Fee
	7	1 Story Building	190,000	200,000	Fee Title
	10	Vacant	40,000	40,000	Fee Title
	11	Vacant	7,700	7,700	Fee Title
	30	N.Y.S. Hospital	8,200,000	37,100,000	Partial Fee
4971	50	Vacant	2,200	2,200	Fee Title

Notes:

1. All properties listed above are required for the Penn Central Dyre Proposal
2. For either the Pelham-Dyre or White Plains-Dyre Proposals two of the properties listed above are required Block 3861, Lot 14 and Block 4971, Lot 50.
3. All valuation costs shown are in dollars.

consequences to the owners and surrounding community in condemning these properties for transit use, their taking, would be insignificant.

In considering the Penn Central-Dyre proposal, of the 21 properties required to implement the construction 16 are required in fee title and 5 in partial fee. The partial fee takings are minimal and in all cases affect only small areas of the unimproved portions of the properties. The fee title takings fall into three categories 6 vacant, 6 commercial and 4 residential. In the residential properties 6 family relocations would be required and they are all located in the area of the proposed new Bronxdale Avenue Station northeast of the Parkchester development.

The market value of the 21 properties has been estimated at \$1.4 million. This was determined by totalling the 1975-76 assessed valuation of all the properties required in fee title and applying a 2.5 multiplier factor to the result. This factor is the average at the present time for real estate costs in the northeast Bronx. In addition a flat fixed average amount of \$25,000 was added for each partial fee taking.

This real estate cost relative to the total cost of the Penn Central-Dyre proposal is not significant and should not be a factor in evaluating the plan. However, in terms of the consequences to the owners, the community and of the time consuming procedures necessary for condemnation the property requirements are a definite negative factor against the Penn Central-Dyre proposal.

Summary

In summarizing the material presented in this chapter the following factors are clearly indicated.

1. On a capital cost basis the White Plains Dyre proposal is approximately 15% less expensive than either of the other two plans.
2. On a net annual operating cost basis the Penn Central-Dyre proposal is \$8.6 million costlier than the White Plains-Dyre plan and \$16.7 million costlier than the Pelham-Dyre plan.

3. The Penn Central-Dyre plan requires 21 properties to implement the construction, while both the White Plains Dyre and Pelham Dyre plans require only two.

An analysis and evaluation of the proposals based on both engineering and transportation considerations will follow in Chapter VII.

CHAPTER VII

EVALUATION AND ANALYSIS OF ALTERNATIVE PROPOSALS

VII. EVALUATION AND ANALYSIS OF ALTERNATIVE PROPOSALS

Introduction

In this Chapter the three proposals will be analyzed and evaluated on both a transportation and engineering basis to highlight the advantages and disadvantages of each individually and also relative to the other proposals.

On a transportation basis the areas of analysis and evaluation will be passenger comfort and convenience, impact on each and other modes of transportation and relationship to planned projects and developments.

On an engineering basis the areas of analysis and evaluation will be, feasibility and impact of construction, impact on private property, impact on existing transit facilities and operations and capital and operating costs.

The transportation portion will be presented first to be followed by the engineering and summary sections.

Transportation

a. Passenger Comfort and Convenience

Many measures indicate passenger comfort and convenience, however, the most critical is crowding. Tables 34 and 35 show various loading characteristics of subway lines under each proposal at both the Harlem River and Entering Midtown Manhattan Cordons, respectively.

At the Harlem River Cordon, there is a seated load on the Lexington Local under the Pelham-Dyre Proposal. Under the other proposals, only the Second Avenue Line trains carry a seated load. At the Entering Midtown cordon, all lines have standees.

In Chapter II, the two load factors in Table 26, indicate the following:

TABLE 34

LOADING CHARACTERISTICS ON STUDY AREA SUBWAY LINES
A.M. PEAK HOUR - HARLEM RIVER CORDON

	1973		1990 Proposals		
	Actual	Model-Predicted	Pelham-Dyre	Penn Central-Dyre	White Plains Rd.-Dyre
<u>No. Persons Seated</u>					
Second Ave. Line	-	-	18,000	17,600	17,800
Lexington LCL	12,000	12,000	11,000	12,000	12,000
Lexington EXP	12,000	12,000	12,000	12,000	12,000
Seventh Ave. EXP	6,000	6,000	6,000	6,000	6,000
<u>Seat Load Factor</u>					
Second Ave. Line	-	-	100%	98%	99%
Lexington LCL	100%	100%	92%	100%	100%
Lexington EXP	100%	100%	100%	100%	100%
Seventh Ave. EXP	100%	100%	100%	100%	100%
<u>No. Persons Standing</u>					
Second Ave. Line	-	-	6,300	-0-	-0-
Lexington LCL	11,700	11,500	-0-	7,000	11,200
Lexington EXP	22,700	22,800	18,100	17,000	13,200
Seventh Ave. EXP	4,800	4,900	1,900	1,700	1,100
<u>% Standing of Total Load</u>					
Second Ave. Line	-	-	26%	-0-	-0-
Lexington LCL	49%	49%	-0-	37%	48%
Lexington EXP	65%	66%	60%	59%	52%
Seventh Ave. EXP	44%	45%	24%	22%	15%
<u>TOTAL LOAD</u>					
Second Ave. Line	-	-	24,300	17,600	17,800
Lexington LCL	23,700	23,500	11,000	19,000	23,200
Lexington EXP	34,700	34,800	30,100	29,000	25,200
Seventh Ave. EXP	10,800	10,900	7,900	7,700	7,100
<u>GRAND TOTAL</u>	69,200	69,200	73,300	73,300	73,300

TABLE 35

LOADING CHARACTERISTICS ON STUDY AREA SUBWAY LINES
A.M. PEAK HOUR - ENTERING MIDTOWN MANHATTAN CORDON

	1973 Model- Predicted	1990 Proposals		
		Pelham- Dyre	Penn Central- Dyre	White Plains Rd.- Dyre
<u>No. Persons Seated</u>				
Second Avenue Line	-	18,000	18,000	18,000
Lexington LCL	12,000	12,000	12,000	12,000
Lexington EXP	12,000	12,000	12,000	12,000
Seventh Ave. EXP	12,000	12,000	12,000	12,000
<u>Seat Load Factor</u>				
Second Ave. Line	-	100%	100%	100%
Lexington LCL	100%	100%	100%	100%
Lexington EXP	100%	100%	100%	100%
Seventh Ave. EXP	100%	100%	100%	100%
<u>No. Persons Standing</u>				
Second Ave. Line	-	11,700	5,100	5,300
Lexington LCL	13,900	100	8,000	12,400
Lexington EXP	29,300	21,000	19,900	16,000
Seventh Ave. EXP	14,400	11,400	11,200	10,500
<u>% Standing of Total Load</u>				
Second Ave. Line	-	39%	22%	23%
Lexington LCL	54%	1%	40%	51%
Lexington EXP	71%	64%	62%	57%
Seventh Ave. EXP	55%	49%	48%	47%
<u>TOTAL LOAD</u>				
Second Ave. Line	-	29,700	23,100	23,300
Lexington LCL	25,900	12,100	20,000	24,400
Lexington EXP	41,300	33,000	31,900	28,000
Seventh Ave. EXP	26,400	23,400	23,200	22,500
<u>GRAND TOTAL</u>	93,600	98,200	98,200	98,200

1. The Pelham-Dyre Proposal relieves the Lexington Avenue Local to a significant extent, pro forma 1973. The reduction, from 67% to 28%, however, this is not important, because the 67% load factor is acceptable. It does decrease the load on the Lexington Avenue Express, but only a small amount. The Lexington Avenue Express, which is in need of relief, really does not receive it in the Pelham-Dyre Proposal;

2. The Penn Central-Dyre Proposal relieves the Lexington Avenue Express a few more percentage points than does the Pelham-Dyre Proposal. However, the Lexington Avenue Express would still be operating very near capacity;

3. The White Plains Road-Dyre Proposal relieves the Lexington Avenue Express the best of all the three proposals. In addition, the load factors, in general, seem to be best balanced under this proposal. Only the Second Avenue Line seems to have a low load factor, but its 46% load factor is translated into the fact that about one-quarter of its passengers are standing entering midtown Manhattan.

There are several other ways to indicate passenger convenience. Two tables are presented. Table 36 shows the number of transfers that take place at critical Bronx transfer stations. Because transferring is inconvenient, the fewer number of transfers that take place, the better the condition. The Penn Central-Dyre Proposal would require the greatest number of transfers at the three stations shown. The other two proposals have significantly fewer transfers, with the White Plains-Dyre Proposal being the best condition.

Table 37 shows passenger minutes that would be expended by study-area residents going to midtown Manhattan under each of the three proposals. The data represents a multiplication of the number of Bronx-to-Manhattan passengers on each study-area transit line times an average run time to midtown Manhattan. The Table shows about a ten percent increase in passenger minutes from 1973 to 1990 pro forma. This is basically because of the increase in passengers due to new developments, especially along the Dyre Avenue Line. Of the three proposals, only the White Plains Road-Dyre Proposal offers a significant decrease in total passenger minutes. This result could be considered important, because it shows the numbers of passengers and the run times that they save in combination. It could be said that in terms of service to passengers, the White Plains Road-Dyre Proposal is the best of the three proposals.

TABLE 36

NUMBERS OF TRANSFEREES* AT MAJOR BRONX TRANSFER STATIONS
IN AM PEAK HOUR

	Pelham-Dyre Proposal	Penn Central-Dyre Proposal	White Plains Rd.- Dyre Proposal
E. 180th Street	5,900	5,000	800
Hunts Point Ave.	5,200	6,900	8,000
E. 149th Street- Grand Concourse	3,200	3,100	2,900
TOTALS	14,300	15,000	11,700

NOTE: * Transferees are the number of passengers entering the station and getting off one line in order to board another line at that station.

TABLE 37
PASSENGER MINUTES FOR STUDY AREA PASSENGERS USING SUBWAY LINES TO
MIDTOWN MANHATTAN IN AM PEAK HOUR

Subway Line	1973 Model- Predicted	1990 Pro Forma 1973	1990 Pelham-Dyre	1990 Penn Central- Dyre	1990 White Plains Rd.- Dyre
Pelham Line	547,100	598,700	579,900	422,500	598,700
Penn Central Line	-	-	-	212,000	-
Dyre Ave. Line	171,200	232,600	198,600	171,800	198,600
White Plains Rd. Line	444,800	449,800	449,800	426,500	374,900
TOTALS	1,163,100	1,281,100	1,228,300	1,232,800	1,172,200

Another measure of convenience is access. Table 38 shows access characteristics in the AM peak hour from study-area subway lines to the South Bronx, the East Side of Manhattan, and the West Side of Manhattan. The Penn Central-Dyre Proposal offers the most direct service; the White Plains Road-Dyre Proposal the least. All proposals are about equal in offering either direct or transfer access. Therefore, the Penn Central-Dyre Proposal has an edge over the other proposals in terms of access.

A final measure of convenience is frequency. Short headways are essential to good, convenient rapid transit service. Table 39 shows headways under each of the three proposals. All headways are below four minutes. The Penn Central-Dyre Proposal offers the lowest headways on all study-area subway lines. The White Plains Road-Dyre Proposal offers headways which are almost as attractive. However, the Pelham-Dyre Proposal offers a somewhat lesser service. It is the only case where the headways are considerably worse than are now offered (four minutes instead of the current two minutes). Therefore, from a headway standpoint, the Pelham-Dyre Proposal is least favored. The same type of analysis could be carried out for capacity consideration, and would lead to the same result.

b. Impact on and of other Modes

1. Effects on Private Bus Operators

In order to receive grants from the Federal Government for the implementation of any of the proposals studied herein (or for any transit improvement), the effects are deleterious, then the private operators must be compensated for losses which would be incurred as a result of the project implementation.

The private operations in the study area which might be affected are New York Bus Service's express bus routes (BxM6, BxM7 and BxM7a), Pelham Parkway Bus Service's express bus route (BxM11), and Queens Transit's feeder service from Co-op City to the Pelham Line (QBx1).

It is felt that there will be minimal impact on the express bus routes as a result of the implementation of any of the proposals discussed in this report. This judgment is based on the premise that express bus riders use that mode, rather than subway, because other important factors, such as cost and time, favor the subway mode.

TABLE 38

ACCESS CHARACTERISTICS OF STUDY AREA SUBWAY LINES IN AM PEAK HOUR

	Pelham-Dyre	Penn Central-Dyre	White Plains-Dyre	Current
Access to South Bronx Hub 149th Street-3rd Avenue				
Pelham Line	Backhaul	Backhaul	Backhaul	Backhaul
Penn Central Line	-	Backhaul	-	-
Dyre Avenue Line	Transfer	Transfer	Transfer	Direct
White Plains Road Line	Direct	Direct	Transfer	Direct
Access to East Side - Manhattan				
Pelham Line	Direct	Direct	Direct	Direct
Penn Central Line	-	Direct	-	-
Dyre Avenue Line	Transfer	Transfer	Transfer	Transfer
White Plains Road Line	Direct	Direct	Direct	Direct
Access to West Side - Manhattan				
Pelham Line	Transfer	Transfer	Transfer	Transfer
Penn Central Line	-	Transfer	-	-
Dyre Avenue Line	Direct	Direct	Direct	Transfer
White Plains Road Line	Direct	Direct	Transfer	Direct

Notes: Direct means no change of train.

Transfer means a single change of train without backhaul.

Backhaul means one segment of trip is on an "outbound" train.

TABLE 39

AVERAGE HEADWAYS AND CAPACITIES OF STUDY AREA SUBWAY LINES
IN THE AM PEAK HOUR CURRENTLY AND UNDER EACH PROPOSAL

	Currently		Pelham-		Penn Central-		White Plains Road-	
	Average Headway	Capacity per Hour	Average Headway	Capacity per Hour	Average Headway	Capacity per Hour	Average Headway	Capacity per Hour
Pelham Line	2	42,000	4	25,200	2	42,000	2	42,000
Penn Central	-	-	-	-	4	25,200	-	-
Dyre Avenue Line	8	10,500	4	25,200	4	25,200	4	25,200
White Plains Road Line	3-1/2	24,000	3-1/2	24,000	3-1/2	24,000	4	25,200

Note: Capacity based on 1,400 passengers per train for IRT;
1,600 passengers per train for Second Avenue Line.

Run times from specific locations in the study area to Manhattan are generally longer by express bus than by subway. This is shown in Table 40. Since most of the express bus riders are former subway riders, it can be deduced that they switched to express bus for comfort and convenience of the bus. Therefore, despite the fact that each of the proposals do shorten run time and decrease crowding, it is not probable that large numbers of riders would be diverted to the subway from express buses if the proposals were implemented.

The one private local service route, QBx1, would probably not be significantly affected by either the Pelham-Dyre or White Plains-Dyre proposals because Co-op City residents would still use that route to reach the subway at the Pelham Bay Park Station. There probably would be a significant effect if the Penn Central-Dyre Proposal were implemented, because some of the residents of Co-op City, particularly those living in the southern section of the development, could walk to a subway station: the Co-op City Station on the Penn Central Line. If it is assumed that all subway-bound Co-op City residents in the southern sections walked to the new station, rather than taking the QBx1 to Pelham Bay Park Station, and ridership was a function of total population, then about 25% of the QBx1's feeder service riders would be diverted to "walk feeder" rather than "bus feeder" mode.

This loss would be compounded by the further loss of feeder ridership from the northern sections of Co-op City to the new subway station. This loss would probably occur because MaBSTOA operates two local service bus routes along the same streets as the QBx1 through Co-op City to a terminal at the site of the proposed station. These two routes, Bx15 and Bx17, operate a combined rush-hour headway which is approximately equal to the rush-hour headway of the QBx1. This fact would lead to the conclusion that half of the residents of the northern sections of Co-op City would use the QBx1 to reach the proposed Co-op City Subway Station, and the other half would use the MaBSTOA routes. The maximum effect on the QBx1 would occur if all Co-op City-to-subway trips were diverted to the Co-op City Station from the Pelham Bay Park Station. If this were the case, then about 35% more of the current QBx1-feeder-service riders would be diverted from the QBx1 to the Bx15 and Bx17 routes which are operated by a public agency, MaBSTOA.

TABLE 40

SUBWAY VS. EXPRESS BUS RUN TIMES
FROM STUDY AREA TO MANHATTAN

Run Time to 42nd Street, Manhattan	via Subway	via Express Bus
From Pelham Bay Park Station	37 min	51 min
From 177th Street	30 min (1)	51 min
From 241st Street - WPR	43 min (2)	60 min
From Co-op City	47 min (1)(3)	51 min

- Notes: (1) via Pelham Express
 (2) via Lexington Avenue Thru Express
 (3) Includes ten-minute feeder bus from Co-op City to the Pelham Line

Therefore, if the Penn Central-Dyre Proposal were adopted, there is the possibility that the QBx1 could lose as much as 60% of its Co-op City-to-subway ridership.

2. Impact of Diversion from Auto

In the methodology section of the introduction, it was stated that the model developed for this study assumed no change in modal split. The only growth projected for the subway lines would be as a result of land development and study area population changes. This was basically because such a significant percentage of study-area-to-Manhattan work trips already used the subway (80%). Despite this, diversion from auto was tested. There were several reasons for this. The primary reason was to exhibit the impact of a study-area-to-Manhattan auto diversion to subway. A ten percent auto diversion was arbitrarily chosen. Harlem River and Entering Midtown Manhattan Cordon counts, with a ten percent auto diversion, are shown on Tables 41 and 42, respectively. A comparison of load factors with and without the auto diversion shows that the ten percent auto diversion produces about a one percent increase in load factor in most all cases. Therefore, it can be said that any unforeseen auto diversion would affect all proposals about the same, and that one proposal should not necessarily be chosen over another on the basis of the ability to absorb auto diversions.

c. Relationship to Projects and Development

The data supplied by the Department of City Planning for this study indicates that the study area is rather fully utilized. Much of the construction of buildings has occurred along the subway lines. Unfortunately, the single largest development, Co-op City, does not fit the general pattern. It is outside of the tributary area of a subway station. Of the proposals, only the Penn Central-Dyre Proposal offers any improvement in this situation, but the improvement it offers is not fully satisfying. The location of the Co-op City Station on the Penn Central Line is within walking distance of only the southern section of Co-op City. Residents of the northern sections would need feeder bus service to the subway station. This latter situation is not much different from the situation which would be offered by the other two proposals. The major difference would be that the feeder bus run time would be shortened. Therefore, only the Penn Central-Dyre Proposal offers better subway access to Co-op City residents than do either of the other proposals.

TABLE 41

HARLEM RIVER CORDON COUNTS
SOUTHBOUND IN AM PEAK HOUR WITH AND WITHOUT 10% AUTO DIVERSIONS

	1990 Proposals With 10% Auto Diversions			1990 Proposals No Diversions		
	Pelham- Dyre	Penn Central- Dyre	White Plains Rd.- Dyre	Penn Central- Dyre	White Plains Rd.- Dyre	
<u>CORDON COUNTS</u>						
Second Ave. Line	24,800	18,000	18,100	24,300	17,600	17,800
Lexington Ave. LCL	11,200	19,200	23,600	11,000	19,000	23,200
Lexington Ave. EXP	30,500	29,400	25,600	30,100	29,000	25,200
Seventh Ave. EXP	8,000	7,900	7,200	7,900	7,700	7,100
<u>LOAD FACTORS</u>						
Second Ave. Line (1)	49%	36%	36%	48%	35%	35%
Lexington Ave. LCL (2)	27%	46%	56%	26%	45%	55%
Lexington Ave. EXP (2)	73%	70%	61%	71%	69%	60%
Seventh Ave. EXP (3)	38%	38%	34%	37%	36%	33%

NOTES:

- (1) Assuming two minute headways, 1680 passengers per train.
- (2) Assuming two minute headways in 1973; 1400 passengers per train.
- (3) Assuming four minute headways in 1973; 1400 passengers per train.

TABLE 42

ENTERING MIDTOWN MANHATTAN CORDON COUNTS
SOUTHBOUND IN AM PEAK HOUR WITH AND WITHOUT 10% AUTO DIVERSION

	1990 Proposals With 10% Auto Diversions				1990 Proposals No Diversions		
	Pelham- Dyre	Penn Central- Dyre	White Plains Rd.- Dyre	Pelham- Dyre	Penn Central- Dyre	White Plains Rd.- Dyre	
<u>CORDON COUNTS</u>							
Second Ave. Line	30,300	23,500	23,600	29,700	23,100	23,300	
Lexington Ave. LCL	12,200	20,300	24,700	12,100	20,000	24,400	
Lexington Ave. EXP	33,300	32,300	28,400	33,000	31,900	28,100	
Seventh Ave. EXP	23,600	23,300	22,700	23,400	23,200	22,500	
<u>LOAD FACTORS</u>							
Second Ave. Line (1)	60%	47%	47%	59%	46%	46%	
Lexington Ave. LCL (2)	29%	48%	59%	28%	47%	58%	
Lexington Ave. EXP (2)	79%	77%	68%	78%	75%	66%	
Seventh Ave. EXP (2)	56%	55%	54%	55%	55%	53%	

NOTES:

- (1) Assuming two minute headways, 1680 passengers per train.
 (2) Assuming two minute headways in 1973; 1400 passengers per train.

Because the Penn Central-Dyre Proposal includes the construction of a new subway line, it also opens other areas to direct or more direct subway access. The Yeshiva University-Einstein College of Medicine, its hospital and housing complexes would be within walking distance of the Eastchester Road Station of the proposed new line. The northwest portion of Parkchester would be near the White Plains Road Station; and the southern portion of Morris Park would be near the Bronxville Avenue Station. Therefore, the Penn Central-Dyre Proposal does have the advantage over the other proposals of providing subway access to existing development where it does not now exist.

The Department of City Planning also indicated that the only significant undeveloped areas in the study area are in the Penn Central Corridor. Some of the sites which the Department feels are ripe for development are adjacent to proposed stations in the Penn Central Line. Other sites, such as the former "Freedomland" site (which is between the northern and southern parts of Co-op City), are in the corridor, but are not within walking distance of Penn Central Line stations. Nevertheless, in most cases, Penn Central Line stations would be closer to those sites than would stations on the existing subway lines. Therefore, the Penn Central-Dyre Proposal does have the advantage over the other proposals in providing subway access to portions of the study area which the Department of City Planning feels are ready to be developed.

Engineering

a. Feasibility and Impact of Construction

As previously outlined all the construction necessary to implement the proposals is feasible. However at three locations the necessary work would be costly, complex and disruptive to the surrounding area and existing railroad and transit facilities while construction is in progress.

The first such location is in the vicinity of Hunts Point Avenue where for the Pelham Dyre proposal a subway connection is required from the Penn Central right-of-way to the Pelham Bay Park Line. This connection requires a complex flexing in the railroad cut and adjacent thereto the underpinning of the westerly Penn Central track, the underpinning

of a section of the six lane elevated Bruckner Expressway, the maintenance of a heavily used entrance ramp of the expressway, the construction of the southbound connecting track under the Pelham Line and the connection of the new trackage to the Pelham Line all under operations and without disruption to the regular scheduled service. All this would be difficult and costly to accomplish. The estimated cost of this connection alone fully equipped and in place is \$64 million. In total it can definitely be stated that this one item can be counted as a large negative factor against the Pelham Dyre proposal.

The second location is in the vicinity of E. 174th Street where for the Penn Central Dyre proposal a flexing is necessary to extend two tracks to Dyre Avenue and two tracks along the Penn Central to the vicinity of Co-op City. This requires that the northbound Dyre Avenue track be depressed and carried under the southbound Co-op track to avoid a grade crossing. The alignment results in approximately 800 feet of structure whose base of rail is below mean high water and its centerline approximately 60 feet from the bulkhead line of the Bronx River. While this problem is not insurmountable it would be costly and difficult to overcome since all the construction would have to be progressed in a relatively narrow area between an operating railroad and the Bronx River.

The third location is in the vicinity of Eastchester Road where for the Penn Central Dyre proposal lead tracks in subway are required between the railroad right-of-way and Westchester Yard. The new trackage would pass below the operating tracks of the railroad then through six parcels of private property to enter Westchester Yard. The construction would be costly, difficult and disruptive to the surrounding area. The estimated cost of the lead tracks alone, fully equipped and in place is \$32 million and it can be stated that this one item is a definite negative factor against the Penn Central Dyre proposal.

An additional consideration in evaluating either the Pelham Dyre or White Plains Dyre proposal is the fact that under both of these plans one branch of the Second Avenue Line is connected to an elevated structure which at the present time is approximately 60 years of age. As previously outlined the elevated portions of both the Pelham and White Plains Road Lines are presently well maintained and are in good condition,

however it can be expected that sometime in the future their useful service life will be reached and at that time the same will not be true of the new construction to be provided for the Second Avenue Line.

b. Private Property Requirements

As outlined in Chapter VI for both the Pelham Dyre and White Plains Dyre proposals only two parcels of private property are required to implement the construction. For the Penn Central Dyre proposal a total of 21 properties are required.

The costs of the real estate in relation to the total capital costs is insignificant (less than 1/2%), however in terms of the consequences to the owners, the community and the time consuming procedures necessary for condemnation the property required for the Penn Central Dyre proposal is a large negative factor against the plan.

c. Impact on Transit Authority Facilities and Operations

Of the three plans the Penn Central Dyre proposal would have the least impact on present Transit Authority facilities and operations.

This is so because one of the branches is a totally new line. The other, the Dyre Line, by being connected to the Second Avenue Line will improve operations on the White Plains Road Line. This occurs because a meshing will be eliminated at E. 180th Street resulting in an increase in capacity and flexibility on the White Plains Road Line.

The one negative factor is the dispersal of the Maintenance of Way track paneling and material storage area at Westchester Yard to make way for storage facilities. As previously mentioned in Chapter V this facility will be dispersed to E. 180th Street, E. 239th Street and Jerome Avenue Yards. This will severely restrict the output and efficiency of the Maintenance of Way Department in performing this work function as is presently done in Westchester Yard.

For the Pelham Dyre proposal the Dyre connection and the loss of Westchester Yard to the Maintenance of Way Department is identical in impact as with the Penn Central Dyre plan.

The connection to the Pelham Line adds an additional complication with the proposal. As previously stated the existing Lexington Avenue Local service will terminate at Hunts Point Avenue and use the middle track of the Pelham Bay Park Line for access to Westchester Yard. This will create a condition where the new terminal is some 3.5 miles from Westchester Yard. Any train breakdowns on this long lead track will seriously disrupt service on the line. This single condition adds a large negative factor against the Pelham Dyre proposal.

For the White Plains Dyre plan the only major consideration is the loss of the E. 239th Street Yard to the A Division. As previously stated this loss will be made up by constructing new storage tracks at E. 180th Street, utilizing the middle track north and south of E. 180th Street for layup of revenue trains and modifying and upgrading the existing E. 180th Street barn to accommodate monthly inspections for the A Division fleet. Although this can be implemented without major difficulty it can be stated that the resulting condition will be somewhat less efficient and desirable than the present facilities and operations.

If the proposals were ranked on the basis of impact on Authority facilities and operations, the Penn Central Dyre plan would be the least disruptive followed by the White Plains Dyre and Pelham Dyre proposals.

As previously stated under all plans, it is recommended that the present service track between E. 174th and E. 180th Streets be replaced with a connection from the Penn Central to Westchester Yard under Waters Place. This will result in a definite improvement over the existing facilities.

d. Capital and Operating Costs

As previously outlined in Chapter VI the Pelham Dyre plan is the most expensive on a capital cost basis closely followed by the Penn Central Dyre plan. The White Plains Dyre proposal is the least expensive plan some \$59 million less than the Pelham Dyre proposal and some \$42 million less than the Penn Central Dyre proposal.

On a net annual operating cost basis the Penn Central Dyre plan is the most expensive. The Pelham Dyre proposal is the least expensive, by some \$16.7 million a year less than the Penn Central Dyre proposal and some \$8.6 million less than the White Plains Dyre proposal.

All the proposals on a capital basis cost approximately \$260-\$320 million and amortizing this over the relatively long service life of the new transit facilities it can be stated that on this basis all the proposals can be assumed similar. However, on a net annual cost basis the Penn Central Dyre proposal is at a definite disadvantage since it would add an additional \$17.91 million a year of new operating expenses on the Authority.

The transportation analysis indicates that no significant new ridership would be generated by any of the plans and therefore serious consideration should be given, prior to approval on implementation, of any plan such as the Penn Central Dyre which would saturate or provide additional transit facilities in a relatively non densely populated outlying area of the City of New York.

Summary

a. Transportation Analysis

Table 43 summarizes the advantages and disadvantages on a transportation basis of each proposal. A good, fair or poor rating was assigned to each proposal for each of the nine transportation factors previously discussed in this Chapter.

A weighted point system was used as follows, two points "good", one point "fair", and zero for "poor". On this basis the Penn Central-Dyre plan receives 12 points, the White Plains Dyre proposals receives 14 points, while the Pelham Dyre proposal receive nine points.

b. Engineering Analysis

Table 44 summarizes the advantages and disadvantages on an engineering basis of each proposal. The six factors were used as previously discussed in this Chapter. Again the weighted point system was used with the results being that the White Plains Dyre plan received 12 points, the Penn Central Dyre plan received 8 points and the Pelham Dyre plan received 6 points.

TABLE 43

SUMMARY ADVANTAGES AND DISADVANTAGES TRANSPORTATION ANALYSIS

Factor	Pelham-Dyre Proposal	Penn Central-Dyre Proposal	White Plains Road-Dyre Proposal
Loadins at Cordons	Poor	Fair	Good
Number of Transfers Made (1)	Poor	Poor	Fair
Passenger Minutes	Fair	Fair	Good
Access	Fair	Good	Fair
Headways and Capacities	Fair	Good	Good
Effect on Private Operators	Good	Poor	Good
Effect on Auto Diversion	Good	Good	Good
Relationship to Existing Developments	Fair	Good	Fair
Relationship to Future Developments	Fair	Good	Fair
Good	2 4	5 10	5 10
Fair	5 5	2 2	4 4
Poor	2	2	0
Total Points	9	12	14

NOTE: (1) A high number of transfers gets a poor rating and a low number a good rating.

TABLE 44

SUMMARY ADVANTAGES AND DISADVANTAGES

ENGINEERING ANALYSIS

Factor	Pelham-Dyre Proposal	Penn Central-Dyre Proposal	White Plains Road Dyre Proposal
Construction Feasibility and Impact	Poor	Fair	Good
Impact Private Property	Good	Poor	Good
Impact Existing Transit Facilities	Fair	Fair	Fair
Impact Transit Authority Operations	Poor	Good	Fair
Capital Costs	Poor	Fair	Good
Annual Operating Costs	Good	Poor	Fair
Good	2	1	3
Fair	4	2	6
Poor	1	3	3
	2	6	6
	3	1	0
Total Points	6	8	12

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TABLE 43

SUMMARY ADVANTAGES AND DISADVANTAGES TRANSPORTATION